
INDIA'S POPULATION PROBLEM: A DETERRENT TO INDIA'S PROGRESS

by

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U.S. Technical Cooperation Mission to India

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INDIA'S POPULATION PROBLEM A DETERRENT TO INDIA'S PROGRESS

1. Introduction.

As part of the Program Review of the Health Division of TCM/India, a statement was required on "The Justification for expenditures (of TCM) on Health in India." (See Appendix 1.) The Health Division pointed out the dilemma facing India that the more it succeeded in improving its health program of reducing sickness and death rates, the more it placed in jeopardy the major stated economic aim of trying to double the per capita real income of Indians from about Rs. 300 to Rs. 600 between 1961 and 1981 because of the increased population pressure. Furthermore, since United States policy is aiming to help India in attaining this economic goal, the dilemma also faced the United States that, according to present policy, aid in such health fields as malaria eradication and potable water and sanitary sewerage was helping defeat the main economic goal of United States policy with respect to India. Nevertheless, one could not conceive of a nation's trying to move from an under-developed status to a more highly developed status without trying to improve to some degree the environment and potentialities of the people with respect to health. This is especially true of India, with its pride in a long-continuing civilization that formerly ranked very high among the civilizations of the world, and yet now found itself near the bottom of the list with respect to health.

The only apparent solution to this dilemma lies in population

control, which, for a democratic country such as India, must imply some method that would be effective, acceptable, cheap, and humane. Of the methods available, birth control appeared to the Health Division to be the only feasible solution.

When this report was placed before the Committee, chaired by the Minister-Director and attended by all Chiefs in TCM/India as well as some other TCM personnel, it was agreed that the concern over this dilemma was sufficiently strong that a more detailed paper should be submitted to ICA/W for its consideration. The result is this memorandum.

The procedure in this paper will be to make a series of statements, including conclusions, in this section. Each major statement will have a technical appendix reference, where further evidence for that statement will be given in detail.

2. The estimates of total population for India, disregarding undercounts of the Census, are now given officially as follows in millions as of March 1st (See Appendix 2.):

<u>Year</u>	<u>Estimated Population in Millions</u>	<u>%Increase During 5- Year Period Ending</u>	<u>Average Yearly Rate of Increase in %</u>
1951	361.8		
1956	391.4	8.2	1.59
1961	430.8	10.1	1.94
1966	479.6	11.3	2.17

3. Two sets of estimates of Coale and Hoover, thus far very close to the above are as follows, presumably as of March 1st, in millions. (See Appendix 3.) Projection A assumes that the 1951 estimated age-specific birth rates will remain unchanged and

The first part of the report
 deals with the general situation
 in the country and the
 progress of the work.

The second part of the report
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Date	Description	Amount	Total
1930	Jan 1	100.00	100.00
1930	Feb 1	200.00	300.00
1930	Mar 1	300.00	600.00
1930	Apr 1	400.00	1000.00

The sixth part of the report
 deals with the results of the
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 work.

Projection B assumes that they will decline by 50% linearly from 1966 to 1981. As of now, Projection A appears to be more likely.

Year	Estimated Population in Millions		% Increase During 5-Year Period Ending		Average Yearly Rate of Increase in %	
	<u>A</u>	<u>B</u>	<u>A</u>	<u>B</u>	<u>A</u>	<u>B</u>
1971	539.4	531.3	12.5	10.8	2.4	2.1
1976	609.4	577.0	13.0	8.6	2.5	1.7
1981	691.5	611.4	13.5	6.0	2.6	1.2
1986	785.9	642.9	13.7	5.2	2.6	1.0

4. Even in 1951, the population of India, disregarding the skills of that population, was excessive relative to the land and capital available. Reorganization alone could not have raised the real per capita income of that population to a level approaching western standards. (See Appendix 4.)

5. In 1951, the distribution of skills and the attitudes of the people were such that effective reorganization that was theoretically possible would not have been feasible under a democratic system. (See Appendix 5.)

6. To ensure a rising secular trend of real per capita income, three conditions are essential to India: (a) The output-labor ratio must show a constantly rising trend. The major requirements for such success from available historical evidence are a stable government and the relative increase in the use of capital per worker, where capital is derived from savings, (b) There must be an ever-increasing distribution of labor skills required to utilize effectively the new capital that is created. This means an increase in vocational training.

(c) There must be an ever-increasing development of organizational skills on the part of leaders to make the most effective use possible of the land, labor, and capital available at any given time. (See Appendix 6.)

7. The expected increase in the population is such that increased savings become more and more difficult primarily for two reasons:

(a) Such unchecked increases in the population will increase rather than decrease in the short run, at least until 1986, the already high ratio of dependents to labor force. With a low per capita income at the beginning, such an increase in dependents makes savings under a voluntary system exceedingly difficult.

(b) A large portion of such savings that are made must go into such capital formation as intensified farming, housing, school, and hospitals to give the additional population only the standards of the former smaller population. To increase real per capita income, the new capital formation should be such that there is a net increase in productivity, not merely a maintenance of the former level. (See Appendix 7.)

8. To summarize the above points, India's aim, supported by United States policy, is to double the real per capita income from Rs. 300 to Rs. 600 between 1961 and 1981. Per capita income means national income (numerator) divided by population (denominator). In arithmetic one may double the answer by doubling the numerator or by halving the denominator or by some other combination such as multiplying the numerator by four and the denominator by two. In such arbitrary exercises, the numerator and the

denominator may be treated independently. In trying to double real per capita income, the numerator is not independent of the denominator but is dependent on it. Given the conditions of India, it is very much more difficult to quadruple the national income while the population is doubling than to double the national income while the population remains constant. The reason is that the gross land area remains fixed and real per capita income must be increased primarily by the increase of productivity through net per capita increase in the use of capital. New capital can be formed only by savings, and the increase in the population with its accompanying increase in the ratio of dependents to workers makes such savings more and more difficult as well as requiring more and more capital merely to maintain the present low standards. An essential policy for success in achieving India's economic goal is therefore drastic population control. (See Appendix 8.)

9. The Government of India, including the 14 State Governments, recognizes the problem officially. Family planning has the official sanction of the governments. Attempts to encourage family planning are being made, and some success has been achieved, particularly in the increase in voluntary sterilizations, for which economic inducements have been offered by some state governments. (See Appendix 9.)

10. Unfortunately, as of now, the effectiveness of the family planning programs is not apparent from current data. For a variety of reasons involving lack of good, acceptable methods as well as

the widespread Hindu belief that there is no salvation without a son ("Aputrasya gatirnasti"), the forecast of effective population control without a greatly increased campaign is exceedingly slim. (See Appendix 10.)

THE JUSTIFICATION FOR EXPENDITURES ON HEALTH IN INDIA

1. One of the most powerful new concepts, developed since the 18th Century and constantly gaining adherence, is that it is possible for all social groups and all mankind to progress simultaneously. Previously the progress of a group, whether it was a family or a nation, was believed to occur primarily by taking something away from somebody else or by judicious marriage. Without question, extensive foreign aid would not be supported by large and influential groups in the United States unless there was a widespread belief in this concept of general progress in some sense at least and that it is to the interest of the United States to help implement this general progress.

2. Another powerful concept that has been widely but not universally accepted in the United States is that it is possible and desirable to have a higher general level of well-being and at the same time to reduce the inequalities of the distribution of that well-being. This has been implemented largely by our income and estate tax laws, and we have observed that, compared with thirty years ago, the real per capita income has increased at the same time that the proportionate share going to the highest one percent has decreased and the proportionate share going to the lowest group has increased. Certainly the idea of foreign aid is consistent with this aim of raising the general level of well-being of a group of countries and simultaneously narrowing to some extent the gaps between such extremes as India and the United States. Fortunately, improvement in the general status of health in India or any country does not mean a deterioration

of health in the United States. Actually, in these days of rapid transit it may mean the reduction of transmission of disease to the United States.

3. Granted the two ideas expressed above, the fundamental question then arises concerning those primary areas in which efforts should be exerted to raise the general level of well-being and to narrow the gaps. Although economic considerations are important, these areas reflect primarily the fundamental desires of social groups as expressed by their leaders, whether governmental or non-governmental. The most widely accepted measures of the progress of a society, that are constantly emphasized by leaders everywhere, are: (1) the economic component as measured by real per capita income, (2) the health component as measured by the expectation of life at birth, and (3) the literacy rate as measured by the proportion of people who can read or write a simple sentence in any language.

4. If the economic component appears to get the highest priority among the three, it is recognized that in general both a high expectation of life at birth and a high literacy rate are statistically associated with economic progress as measured by real per capita income. In other words, if a country ranks high in one, it ranks high in all. It would be difficult if not impossible to establish direct cause-effect relations; but most people would agree that economic progress is easier to attain if you have a literate and healthy, vigorous labor force than if you do not. They may not be necessary conditions, but they are helpful conditions. This belief seems to be followed, for

example, at Kuwait, where a tremendous increase in economic well-being in a short time because of the good fortune of oil exploitation has resulted in large expenditures on health and education programs presumably to strengthen the base for further economic expansion. One cannot conceive of a modern country making large economic gains without correlative gains in health and education.

5. Nevertheless, in dealing with the scarce resources available relative to the desires of individuals and societies, one must face at all times the question of how those scarce resources should be allocated to give an optimum impact. Furthermore, what should be the allocation in terms of short-run gains in consumption or long-run gains through capital formation? It is our contention that even if the choice were to be based exclusively on the present value in dollars of alternative actions, one could not get adequate data to give a convincing demonstration. For instance, which will have greater economic benefit to India, the expenditure of N dollars on malaria eradication, on vocational education, or on improving storage for food grains, if only one can be done? With our present limitations of knowledge, we believe that the answers to this type of question must be largely but not entirely dependent on informed guesses. This is just as true within a profit motivated business in the United States when one tries to balance economic benefits derived from spending more money on advertising, on industrial relations, or on increasing participation in community affairs such as community

chests. Yet priorities must be established, and one wants to follow a better principle than "The squeaky wheel gets the grease." How can it be done?

6. With respect to India, it is certainly an important aim of the aid program to promote stability of government. It is very difficult to maintain the stability of government, even for a police state which India is not, unless the ordinary people get tangible evidence of improvement in their own well-being. It is our contention that in India this means more than a rise in real income, important and dominant as that is. With a life expectation at birth of only about 32 years in 1951 and an infant mortality rate of probably 200 to 250 per 1,000 live births, Indians know that their rating in health is one of the world's lowest. The pressures of national pride as well as the pressures of individual tragedies that these measures reflect give evidence of the requirement of dramatic improvement, which we know can be made by such means as providing potable water, sanitary sewerage, malaria eradication, immunizations, maternal and child care, and in general the more wide-spread benefits of preventive and curative medicine. Such measures have been proven effective not only elsewhere but also where tried in India. These are essential components of the progress of India, if a stable government is to be maintained. This stability in turn is obviously a requirement for economic progress. The question, we believe, is not whether it is to be interest of the United States to give aid in this field of health. The questions, rather, are how

much aid to give in health and on what specific projects. In general, the amount has to be set by viewing the alternative demands from agriculture, industry, etc. with a view to balanced progress. The allocation within health must be set largely by judging the relative impacts on and desires of the Indian population and government. For example, we believe that the program of malaria eradication is having a great and beneficial impact and the failure to continue this program would be of real harm both to India and to the United States. This and the proposed increase in emphasis on water supply and sanitation to reduce gastro-intestinal diseases have caught the imagination of the leaders of India and direct benefits can be made manifest to the people.

7. We would be remiss, however, if we did not emphasize the dilemma inherent in aid programs in health to India, controversial as it may be. The current official forecasts for the Indian population are 431 million people in 1961 and 480 million by 1966. Coale and Hoover estimate that with no change in the birth rate, and it is currently estimated at over 40 per 1,000 population, India now faces the prospect of having 775 million people in 1986. This presupposes improvements in health but considerably less improvement than has already been attained in Ceylon. What does this do to India's hope of doubling the real per capita income from about Rs. 300 per year to Rs. 600 per year between 1961 and 1981? Not only is the population increase explosive, but also such an increase has two major economic

impacts: (1) the already very high ratio of dependents to labor force will increase, thus making it even more difficult to make the savings required for new capital formation, which in turn is necessary for improving the output labor ratio; and (2) the present high proportion of effort going into the production of foodstuffs and other minimum necessities cannot be relieved to be redirected into channels that will generate a rising per capita income. The Planning Commission has already accepted a goal of 110 million tons of foodgrain production by 1966 for the expected 480 million people. This requires the very high average rate of increase of 8 percent per year in comparison with the current $2\frac{1}{4}$ to $2\frac{1}{2}\%$ gain. The point is that this desperate situation can be blamed primarily on the decrease in the death rate and the improvement in health. The dilemma is, therefore, that improvements in health, under present Indian conditions, have a detrimental affect on the goal of per capita economic improvement. What should be done?

8. The following comments deal with the problem which the Health Division believes to be the most critical problem currently facing India to which a solution must be found if the economic aid program is to be successful and if India is to meet her developmental goals.

8.1 The most overwhelming problem in India is the problem of population increase. Assuming a continuing high birth rate, net economic gains per capita will be relatively meager.

8.2 The only theoretical methods of containing the potential explosive population increase are: (1) by increasing the death rate, (2) by international emigration, and (3) by reducing the birth rate. No government can or would deliberately attempt to increase the death rate. Emigration on an adequate scale is totally impracticable and in any event would be only a temporary palliative. A reduction in the birth-rate is the only feasible solution.

8.3 How can the effective birth rate be reduced sufficiently to allow net per capita economic gains? The following alternatives are available:

- (1) infanticide, now practiced to some extent in India which no government can promote and should suppress;
- (2) abortion, again being practiced on^a/fairly large scale, but a difficult procedure for a government to recommend, especially when facilities for performing abortions under favorable, /sanitary conditions are very limited; and
- (3) abstinence, including late marriage, which though often advocated by the old has never proved effective in the young; and
- (4) some effective method of preventing conception, several of which are widely known and readily available, and this appears to be the only feasible course.

8.4 The Government of India has officially adopted family planning as a policy of government and has established a unit within the Health Ministry to carry out this policy. This program is aimed frankly at a marked reduction of the number of conceptions. It is stimulating and supporting research in birth control methods and is opening clinics throughout the country as rapidly as personnel and physical facilities become available. To date the

program has had no impact on birth rates as currently observed nor is it likely to have any real effect in the near future.

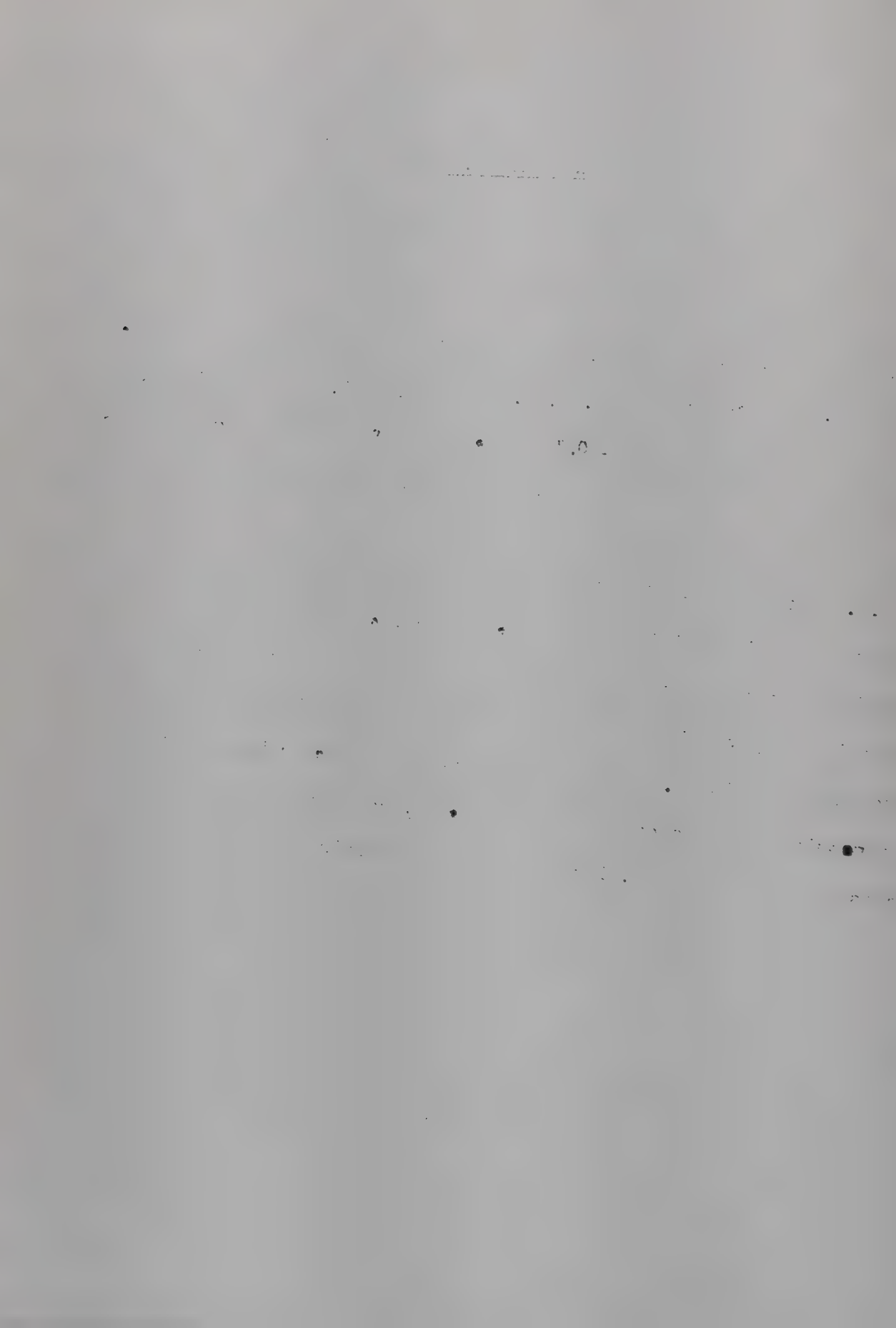
If the Government of India hopes to solve its economic problems, it must take even more cognizance of the population problem and give more effective implementation of its program.

APPENDIX 2

OFFICIAL POPULATION ESTIMATES IN INDIA

A 2.1. At a meeting of the Planning Commission, Government of India on April 22, 1959 chaired by Mr. V. T. Krishnamachari, Deputy Chairman, the population projections of 430.8 millions for 1961 and 479.6 millions for 1966 were accepted as official until the data from the 1961 Census became available.

A 2.2. Although the Planning Commission did not approve officially the methods used in arriving at the projections, because such details are usually left to an expert committee, the report of that expert committee as originally submitted is appended with the exception that Tables II and III are omitted. These latter tables give projections by states. It should be understood that these tables, contrary to the official census tables for 1951, include Jammu and Kashmir and all of Assam.



CENTRAL STATISTICAL ORGANIZATION

(Population Unit)

Subject:- Population projections for official use
pending 1961 Census - Draft Explanatory
Memorandum to be attached.

1. An acceptable series of population estimates for the Country with break up according to characteristics such as regions, sex and age-group is an essential pre-requisite for the design on the 3rd Five Year Plan for India. Even the preliminary totals of the forthcoming Census can be expected only late in 1961. Wide interest in this problem has of late been evinced by demographers and planners both in India and abroad. In the absence of reliable data on current births and deaths and internal migration which are required for estimating the present and future population for India and the constituent states, a variety of projections have been worked based on varying assumptions about the factors.

2. The Working Group on Vital and Health Statistics of the Planning Commission set up a small Expert Committee under the Chairmanship of the Registrar General, India, to recommend a set of population projections for immediate use in planning. The various projections that have been made, the available registration data on births and deaths subsequent to the 1951 Census, the data collected in the first sub-round of the 14th Round of the National Sample Survey and other material bearing on the experience of other Countries at a similar stage of demographic transition have all been studied by the Committee. On the basis of this study the Committee was of the opinion that while fertility patterns and birth

rates have not registered any substantial change, the death rate would have fallen substantially since the last Census, resulting in a higher growth rate during the present decade as compared to the last decade. Since the registration of births and deaths is defective all over the country the extent of the change in the growth rate cannot be calculated from the vital statistics records and has to be estimated on the basis of the results of sample surveys and type-studies and other information of qualitative nature.

3. On the strength of evidence based on such data after examining the projections made based on various assumptions on mortality and fertility trends, a set of projections for 1956, 1961 and 1966 were worked out by the Committee (vide Annexure). The Committee felt that it would be too unrealistic to project the population beyond 1966. Briefly stated, its projections up to 1966 are based on the following considerations:

1. The 1951 Census age distribution corrected for under enumeration in the age groups 0-1 and 1-2 should be accepted as the basis for the future projections.
2. General fertility rate of 0.189 consistent with a birth-rate of 42 per thousand around 1951 would remain unchanged during 1951-66.
3. Mortality could be taken to be improving such that the expectation of life at birth steadily increases from about 32 in 1951 to 50 in 1966 (by 0.9 year each year).

4. The fall in the Indian Life Table death rates be assumed to be the same as that given by the appropriate U.N. Model Life Tables.

5. The statewise breakdown by sex and broad age-groups may be worked out by the 'ratio method'.

4. The "component method" was adopted in making the all-India projection. Separate projections were made of the number of males and females in each age group of the population. It was also assumed that international migration was insignificant. A fuller account of the assumptions and the computational details is given below:

4.1 Age distribution of the Population in the base year 1951

The Committee decided to start with the official Census Actuary's smoothed age distribution keeping the total population of 357 millions fixed. Certain other studies have assumed that these tables are unreliable since age reporting and birth and death re-registration are inaccurate in this Country. These studies have constructed a sex-age distribution based on Lotka's theory of stable population with no migration that a population with a given fertility rate and a given mortality rate will continue to exhibit a constant sex-age distribution pattern depends mainly on the fertility rate and only slightly affected by changes in the mortality rate. The Committee was of the opinion that there was neither need nor sufficient grounds to reject the Census Actuary's distribution but since the initials age group, (0-4) was known to be underenumerated and was inconsistent with the fertility

and mortality rates, it was necessary to make some adjustment for it particularly in the ages 0-2 years. Accordingly adjustment was made for possible underenumeration in 0-2 years by calculating the births in the previous two years and their survivors in 1951. The method of calculating births in previous years and their survivors has been described later in this note. Since it was decided to keep the Census total of 357 millions constant and the Census Actuary's age distribution unaltered a smoothing of the distribution was done in the younger ages 0-14 graphically without affecting the overall total population or its distribution beyond 14 years.

4.2 Life Table for the base year

It is felt that whatever information is officially available from observed data should not be rejected unless there is strong evidence against their validity. The 1951 Census Actuary had prepared a Life Table for the decade 1941-50 based on the two censuses of 1941 and 1951. It is well known that information on infant mortality is even scantier than on birth and death rates in the Country. The Census Actuary after a consideration of the registration data generally and in the Health Unit areas where the registration is known to be very good, adopted an infant mortality rate of 190 for males and 175 for females in his life tables. The Committee felt that for the present purposes the Life Tables of the Census Actuary should be taken as the basis. Since the Census Actuary's Life Table represents the average mortality experience of the decade 1941-50, it was related to the mid-point of the

decade, i.e. the year 1946.

4.3 Mortality and fertility rates since 1951

(a) Mortality: The past trend in death rates particularly since 1921 shows that there has been a steady decline in mortality. The death rate around 1951 was about 27.4 as calculated by the Census Actuary. Though the Registered data is deficient in many respects, the data relating to certain areas where the registration is known to be good shows a marked downward trend in death rates subsequent to 1951. In Punjab and Madras, which are reputedly good registration areas, the death rate shows a fall from 16.5 to 13.8 and 25.8 to 14.2 respectively. The various health developmental programmes e.g. Malaria control measures B.C.G. Campaigns use of antibiotics etc. and better nutrition and improvement in medical facilities are probably responsible for the reduction in mortality. The results of the 1st sub-round of the 14th Round also show an unmistakable fall in the death rate in the rural areas. The spleen rate and other indices prepared by the Malaria Institute for the year 1953-1957 show that there is a substantial reduction in the incidence of Malaria. For example in Bihar, Madhya Pradesh and West Bengal the spleen rate fell from 56.1, 34.7 and 20.4 in 1953-54 to 11.2, 8.7 and 4.0 respectively in 1956-57 as a result of the National Malaria Control Programme. It was also noted that in Ceylon which is a country in somewhat similar stage of development the death rate

dropped from about 20 in 1946 to about 11 in 1952 as a result of widespread anti-malaria and other health measures though fertility remained at a sustained higher level. Having agreed on the qualitative aspect of the trend in mortality it became necessary to translate it quantitatively for projection purposes. It was agreed that in projections of this kind a certain amount of arbitrariness cannot be avoided in the assumptions. Taking into consideration the various alternative assumptions made in the projections that are already available, the Committee felt that the improvement in mortality may be estimated to be such that the expectation of life at birth would increase from about 32 years in 1946 (according to the Census Actuary's Life Table) to about 50 years in 1966. In other words the expectation of life at birth would register an average annual increase of about 0.9 years.

(b) Fertility: There is as yet no indication of any marked decline in fertility. The registration data relating to reputedly good registration areas like Punjab, and Madras maintain an almost constant level of birth rate. The results of the 1st sub-round of the N.S.S. 14th Round also corroborate this situation. The age specific fertility rates from the various demographic surveys conducted in India show that under the present Indian conditions the fertility is fairly low in the age group 15-19 rises sharply in 20-24, maintains that level till about 35-39 and afterwards falls abruptly to a considerable extent. This is in contrast with the Western

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1. The first part of the report discusses the general situation of the country and the progress of the work during the year. It also mentions the results of the various committees and the work of the different departments.

2. The second part of the report deals with the financial situation of the country. It gives a detailed account of the income and expenditure of the government and the different departments. It also mentions the results of the various financial committees and the work of the different departments.

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experience where the fertility rate is very high in 15-17 and there is a continuous decline in subsequent ages. This large stretch of high fertility in our country shows that the small increases in age at marriage as revealed by certain studies is not likely to have a dampening effect on fertility. The sustained high level of fertility indicates that no major factor affecting fertility, such as deliberate limitation of family has been as yet operative on any considerable scale. The results of surveys on attitude towards and practice of family planning show that family planning as a potential force in bringing down birth rate is existent if at all only in highly urbanized cities. Industrialization and consequent urbanization which have been the most potent factors in the decline of fertility in the Western Countries are not of immediate importance in bringing down fertility in India. It will be quite some time before Family Planning and changes in living conditions and habits will bring about any perceptible change in the level of fertility. The Committee has therefore assumed a constant level of fertility up to 1966/

4.4 Method of projecting mortality and fertility rates by area

Having decided upon the trend of fertility and mortality up to 1966 the projections are dependent on the construction of the Life Tables every five years and the calculation of births during the quinquennia. It has been mentioned earlier that the Committee had assumed that the expectation of life at birth would improve

from about 32 in 1946 (1941-50 Life Table) to about 50 in 1966. The fall in the Life Table mortality rates that bring about this improvement has to be suitably set in order to calculate the various Life Tables involved. The Committee felt that the rate of fall in the Life Table mortality rates could be conveniently read from the United Nations Model Life Tables, which sets out the average mortality experience of different Countries of the World at various stages of demographic transition. Since the expectation of life at birth in 1946 is around 32 according to the Indian Life Table and since it has been assumed that the expectation of life at birth in 1966 would be around 50, the two Model Life Tables with $e_0 = 32.5$ and $e_0 = 50$ were chosen. The fall in the mortality rates at various five year age groups of the Indian Life Table set at 1946 during the period 1946-1966 was assumed to be proportionate to that indicated by the mortality rates of the chosen Model Life Tables. By this process the mortality rates in various age-groups in 1966 were set. After fixing the mortality levels in the various age-groups 0-4, 5-9 etc. at 1946 and at 1966 the mortality rates in the intervening quinquennia have been set on the assumption that the fall in the mortality rates is linear in the period 1946-1966. Having got these mortality rates Life Tables were constructed. The Life Tables calculated in this fashion relate to the mid quinquennia namely the years 1948.5, 1953.5, 1958.5 and 1963.5. From these Life Tables the survival ratios from one age-group to another were readily derived. The major steps in the construction of the Life

Tables and the calculation of the survival ratios were as follows:

- (i) Starting with a radix of 100,000 births, the survivors at exact ages five years hence were given $l_x + 5 = l_x (1 - 5q_x)$ where $5q_x$ are the mortality rates already calculated in the manner described above.
- (ii) The survivors within the age groups were next obtained from the values as (a) $L_0 = 1.9 l_x + 2.1 l_5$ (c) $5L_0 = L_0 + 4L_1$ (d) $5L_x = 2.5 (l_x + l_{x+5})$ The formula (d) was utilised for getting L_x values up to the age 80. For the ages 85 and above, an approximation suggested by the U.N. in their Manual III has been adopted i.e.
 $L_{85+} = l_{85} \times \log (l_{85})$.
- (iii) With the help of the L_x values obtained as in (ii) above the survival ratios for the age-groups were obtained as (a) P_0 (Survival ratio from birth to age group 0-4) $= 5L_0 / 5l_0$ (b) $P_x = 5L_x + 5 / 5L_x$ (c) $P_{70+} = L_{75+} / L_{70+}$. Given the 1951 quinary age distribution and the corresponding survival ratios, for the succeeding quinquennia, the population 5 and above in 1956, 10 and above in 1961 and 15 and above in 1966 were immediately calculated for both sexes separately.

The next step was to estimate the number of births during the three quinquennia subsequent to 1951. For this purpose, for ease in calculation it was decided that the births should be built up by a suitable choice of the general fertility rate which represents the

ratio of number of births to the female population in the reproductive age 15-44. After a consideration of the general fertility rates assumed in a few projections, the Committee felt that a general fertility rate of 0.189 consistent with a birth rate of 42 per 1000 around 1951 could be assumed. Further in order to separate out the male and female births the sex ratio at birth was assumed to be 105 males per 100 females. The calculation of the number of births in the quinquennia after 1951 and their survivors to age-group 0-4 is illustrated here for the quinquennium 1951-56. The female population aged 15-44 at the mid-point of the quinquennium 1951-56 was first calculated as the simple average of the female population aged 15-44 in 1951-1956. This multiplied by the general fertility rate of 0.189 gave the average yearly number of births during the quinquennium 1951-56. The male and female births were then separated out by the application of the sex ratio at birth of 105 males per 100 females. The survivors in the age group 0-4 in the year 1956 was then calculated by multiplying the total number of births in the quinquennium with the survival ratio P_b drawn from the Life Table set at the year 1953.5. In making the adjustment for underenumeration in the ages 0-2 years in the 1951 age distribution a similar procedure has been adopted. To put it symbolically the calculations are in the following three states: (i) calculate female population at the year 1953.5, 1958.5 and 1963.5 by averaging female populations aged 15-44 in 1951, 1956, 1961 and 1966 two by two. (ii) multiply the female population aged 15-44 calculated in (i) by the general

fertility rate and the sex proportion to give the male and female births separately and (iii) multiply five times the births (male and female separately) calculated in (ii) by P_0 the survival rate from birth to age group 0-4 to give the population in age group 0-4 in the respective years.

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A N N E X U R E

T A B L E I

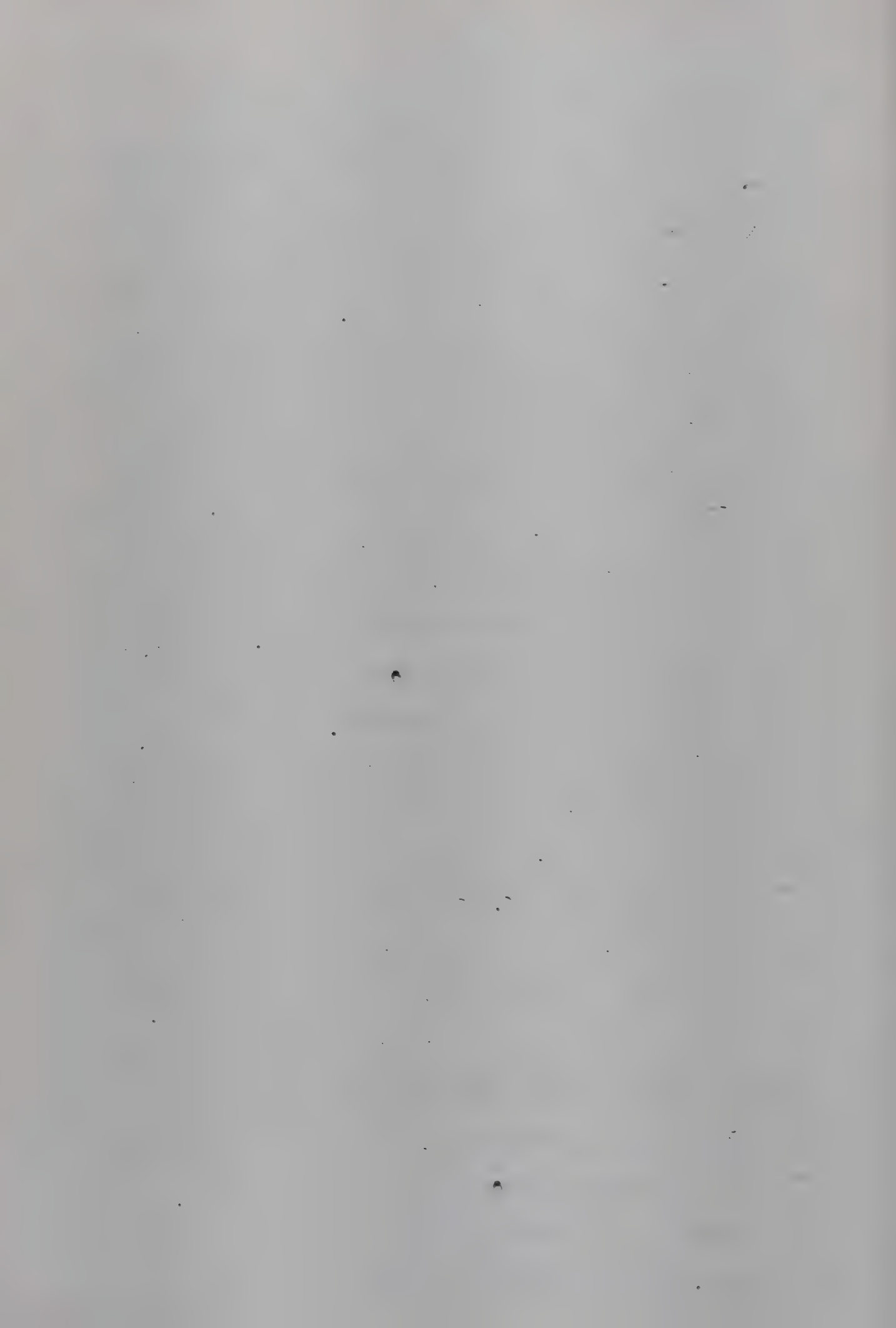
PROJECTED POPULATION OF INDIA BY SEX AND
AGE IN 1956, 1961 AND 1966
(In Millions as on March 1st of the year)

CSO, PU/59-3

Age Group	1951 (Census)			1956			1961			1966		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
0 - 4	53.6	27.0	26.6	63.8	32.7	31.1	70.1	35.8	34.3	77.4	39.3	38.1
5 - 9	43.1	22.1	21.0	47.3	24.1	23.2	57.7	29.7	28.0	64.8	33.3	31.5
10 - 14	39.2	20.2	19.0	40.9	21.0	19.9	45.3	23.1	22.2	55.8	28.7	27.1
15 - 19	36.0	18.4	17.6	37.5	19.3	18.2	39.5	20.2	19.3	44.1	22.4	21.7
20 - 24	32.5	16.5	16.0	34.6	17.5	17.1	36.4	18.7	17.7	38.5	19.6	18.9
25 - 29	29.4	15.0	14.4	31.0	15.7	15.3	33.2	16.8	16.4	35.2	18.0	17.2
30 - 34	26.2	13.6	12.6	27.7	14.2	13.5	29.6	15.0	14.6	32.0	16.2	15.8
35 - 39	22.7	12.0	10.7	24.3	12.7	11.6	26.1	13.4	12.7	28.2	14.4	13.8
40 - 44	19.2	10.2	9.0	20.8	11.1	9.7	22.6	11.9	10.7	24.7	12.8	11.9
45 - 49	16.2	8.6	7.6	17.4	9.3	8.1	19.1	10.2	8.9	21.1	11.2	9.9
50 - 54	13.1	6.9	6.2	14.3	7.6	6.7	15.6	8.3	7.3	17.5	9.3	8.2
55 - 59	10.2	5.3	4.9	11.1	5.8	5.3	12.5	6.6	5.9	14.0	7.4	6.6
60 - 64	7.4	3.7	3.7	8.2	4.2	4.0	9.3	4.8	4.5	10.6	5.5	5.1
65 - 69	4.9	2.4	2.5	5.5	2.7	2.8	6.2	3.1	3.1	7.2	3.6	3.6
70 +	8.1	4.0	4.1	7.0	3.3	3.7	7.6	3.5	4.1	8.5	3.9	4.6
All ages	361.8	185.9	175.9	391.4	201.2	190.2	430.8	221.1	209.7	479.6	245.6	234.0

A 2.3 Three comments are necessary concerning this report:

- (1) 4.3 (b) Fertility, sentence 5. "This is in contrast with the Western experience where the fertility rate is very high in 15-19 and there is a continuous decline in subsequent ages". Reference to the Demographic Yearbook of the United Nations, 1955, Table 21, gives no such evidence. For various recorded years in the early 1950's, no country listed for North America, South America, Europe or Oceania gave a maximum age specific birth rate at age 15-19. In fact, the age specific birth-rate at age 30-34 was higher than that age 15-19 in all such listed countries. This statement, however, is irrelevant to the problem at hand of estimating India's population. Good age specific birth rate data in India are very scanty. The chief reason for accepting a gross fertility rate of 0.189 must lie in the effective crude birth rate, which as of 1951 is generally agreed among experts to have been in the neighborhood of 42 per 1,000.
- (2) It is likely that the age distribution for 1951 still under-states the population under age 15 and somewhat over-states the number age 70 and over. The table shows an absolute decline in those age 70 and over from 1951 to 1956, which is unreasonable when improving health conditions are assumed. This makes little difference, however, in the total, which is the main point of discussion here. More serious is any understatement of females under age 15; because as they move into the reproductive ages, the births



It would be underestimated and consequently the growth potential would be understated.

(3) Table I does not include corrections of total populations for underenumeration of the 1951 Census. The most recent intensive study of India's population by Americans in Ansley J. Coale and Edgar M. Hoover's "Population Growth and Economic Development in Low-income Countries", Princeton University Press, 1958 (hereafter referred to as Coale and Hoover). In their Appendix A, p. 354, they write, "a simple check of the 1951 enumeration in Indian households yielded an estimate that there was a net underenumeration slightly in excess of 1 percent (Census of India, Paper No. 1 of 1955). Our analysis of the age and sex distribution in 1951 indicates that there was a substantial undercount of children under 5 in the Indian Census and also indicates less persuasively an undercount of females. A rough estimate of the two deficiencies in the census count is 20 to 25 million, indicating that if the deficiencies are the results of omissions, the total population should be given as some 360 million rather than 357 million of the census". On this score, therefore, the projections would tend to be understatements of about 6 percent, disregarding the fact that the understatement of young females leads to increasing percentage errors through time, when projections are made, as here, largely by survival ratio methods.

APPENDIX 3

COALE AND HOOVER'S ESTIMATES OF INDIAN POPULATION, 1951-1986

A 3.1. The detailed steps in Coale and Hoover's estimates are given in their Appendix A. A brief summary is provided here. The first problem was to get the best possible pre-sex distribution for 1951. The total census figure was taken as given but some rearrangement was made of the Census Actuary's age-sex distribution to provide more reasonable age pyramids and some relative increase in females. Then infant mortality rates had to be estimated. They were taken to be 225 infant deaths per 1,000 live births in their main tables. Finally life expectations and birth rates had to be assumed. The net result was that only one projection of death rates was made, based primarily on Ceylon's experience during malaria control and improvements apart from malaria that had been experienced elsewhere under as similar situations as possible. They resulted in an estimated improvement in life expectancy at birth from 41.5 years in 1951 to 51.5 years in 1981 and 1986 for males and from 32.8 years in 1951 to 53.1 years in 1981 and 1986 for females (p. 38). It may be noted that in 1952, Ceylon's expectations of life at birth were 57.6 years for males and 55.5 years for females as given in the 1955 Demographic Yearbook of the United Nations, Table 32/ The infant mortality rate was assumed to decline from 225 per 1,000 in 1951 to 88 per 1,000 in 1981 and 1986 (p.357). Ceylons infant mortality rates, and the

data are supposed to be quite good, are given in the 1955 Demographic Yearbook Table 28 as being below 90 continuously from 1949 to 1954.

Three projections are made by Coale and Hoover for three different age-specific birth rate assumptions: (1) that they would remain unchanged, 1951-1986, (2) that they would decrease linearly by 50 percent from 1956-1981, and (3) that they would decrease by 50 percent linearly from 1966-1981. The recorded rural birth rate from the first two sub-rounds of the National Sample Survey is given as 39.10 per 1,000 for 872 sample villages. (National Sample Survey number 36/2, 9 April, 1959, Indian Statistical Institute, Calcutta). At about 500 people per village, their estimated number of persons in the sample is approximately 436,000. From more detailed tables made available by the Indian Statistical Institute, it has been estimated that there have been about 5.5% omissions in births because of recall lapse. If this is true, the National Sample Survey is doing a remarkably good job; but even so, the estimated birth rate would be revised upward to 41.3 per 1000. Since this is more likely to be an underestimate rather than an overestimate, and since there is little if any evidence that urban birth rates are lower than rural birth rates, the conclusion is arrived at tentatively that Coale and Hoover's estimate (2) is no longer applicable; because it would require a current birth rate of less than 40 per 1,000 (p.38). Admittedly, one cannot make such fine distinctions yet with confidence; but hereafter

only Coale and Hoover's estimates (1), high and (3) medium will be discussed, not only for this reason but also because they are closer to the official estimates for 1961 and 1966. For the record, however, the low estimates including Jammu and Kashmir and all of Assam are in millions; 426 for 1961; 464 for 1966, 503 for 1971; 538 for 1976; 570 for 1981; and 597 for 1986 (p.36).

A 3.2. Comparisons of Coale and Hoover's (C & H) medium and high projections for 1951 to 1956 are given in the following table to show how close the totals are, but not necessarily the components, to the official projections (GOI) given in section 2 of this report.

1. The first part of the report is a general introduction to the subject of the study.

2. The second part of the report is a detailed description of the methods used in the study.

3. The third part of the report is a discussion of the results of the study and their implications.

TABLE A 3.2

COALE AND HOOVER AND GOVERNMENT OF INDIA
POPULATION PROJECTIONS, 1951 - 1966(Coale and Hoover's Table 3 multiplied
by 1.014 to include Jammu and Kashmir
and all of Assam)

A. Total Population in Millions

	1951		1956		1961		1966		% C & H to GOI			
	a. C & H	b. GOI	a. C & H	b. GOI	a. C & H	b. GOI	a. C & H	b. GOI	1951	1956	1961	1966
All ages	362.1	361.8	389.5	391.4	429.7	430.8	480.0	479.6	100	100	100	100
Under 15	140.5	135.9	152.0	152.0	170.8	173.1	194.6	198.0	103	100	99	98
15 - 44	165.0	166.0	176.1	175.9	190.3	187.4	207.4	202.7	99	100	102	102
45 - 64	46.5	46.9	50.2	51.0	55.6	56.5	62.5	63.2	99	98	98	99
65 and over	10.1	13.0	11.2	12.5	13.0	13.8	15.5	15.7	78	90	94	99
0 - 4	55.4	53.6	60.8	63.8	69.3	70.1	78.0	77.4	103	95	99	101
5 - 9	44.6	43.1	48.1	47.3	54.7	57.7	63.3	64.8	103	102	95	98
10 - 14	40.5	39.2	43.1	40.9	46.8	45.3	53.3	55.8	103	105	103	96
15 - 19	36.8	36.0	39.2	37.5	42.1	39.5	45.8	44.1	102	105	107	104
20 - 24	32.8	32.5	35.0	34.6	37.7	36.4	40.7	38.5	101	101	104	106
25 - 29	29.0	29.4	30.9	31.0	33.3	33.2	36.4	35.2	99	100	100	103
30 - 34	25.5	26.2	27.2	27.7	29.4	29.6	32.0	32.0	97	98	99	100
35 - 39	22.0	22.7	23.7	24.3	25.7	26.1	28.0	28.2	97	98	98	99
40 - 44	18.9	19.2	20.1	20.8	22.1	22.6	24.5	24.7	98	97	98	99
45 - 49	15.8	16.2	17.0	17.4	18.7	19.1	20.7	21.1	98	98	98	98
50 - 54	12.9	13.1	14.0	14.3	15.4	15.6	17.3	17.5	98	98	99	99
55 - 59	10.2	10.2	11.0	11.1	12.3	12.5	13.9	14.0	100	99	98	99
60 - 64	7.6	7.4	8.2	8.2	9.2	9.3	10.6	10.6	103	100	99	100
65 - 69	5.2	4.9	5.6	5.5	6.4	6.2	7.5	7.2	106	102	103	104
70 and over	4.9	8.1	5.6	7.0	6.6	7.6	8.0	8.5	60	80	87	91

a. Coale and Hoover

b. Government of India

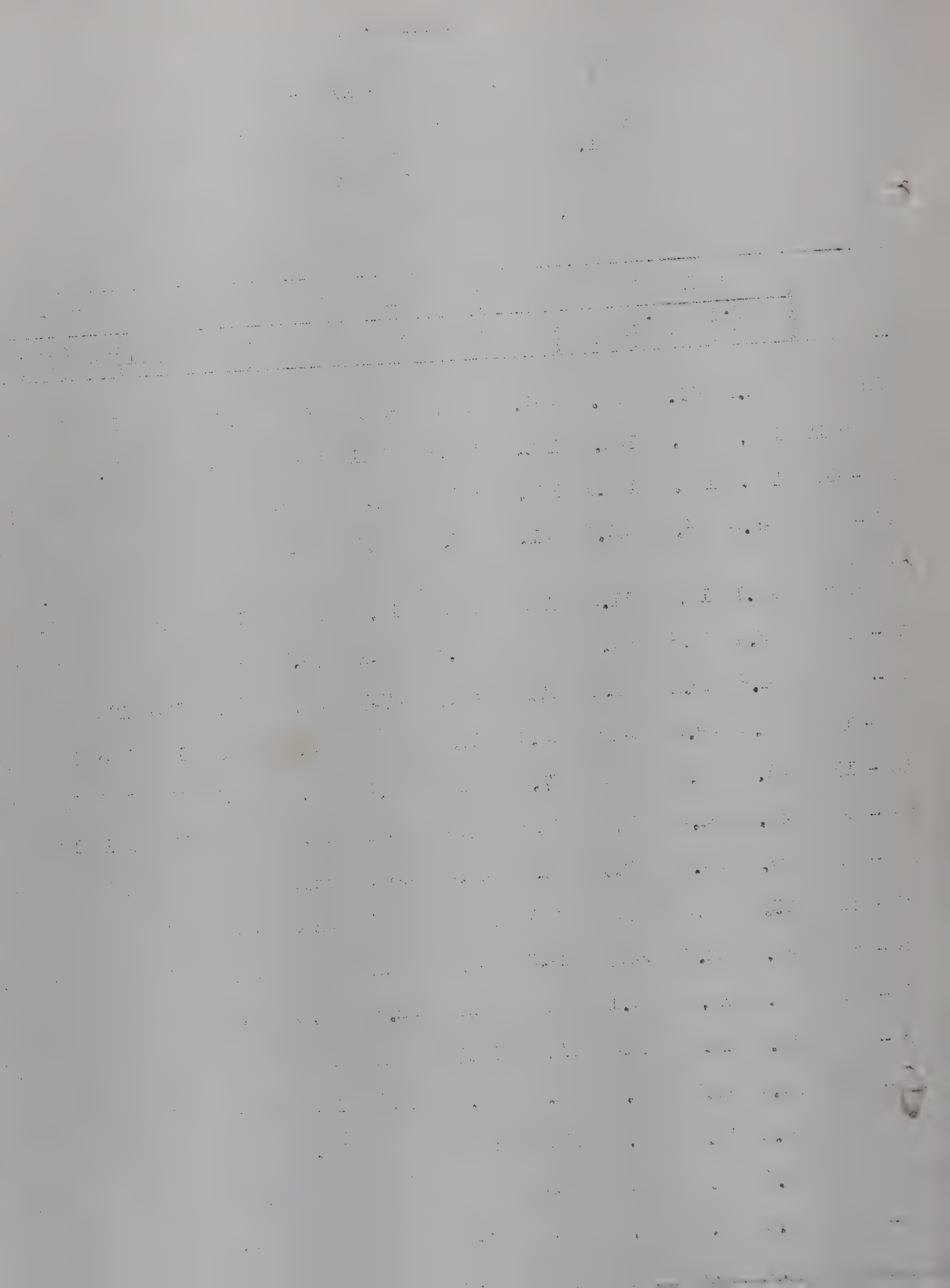


Table A 3.2 (Continued)

B. Population by sex, 1951 and 1966, in Millions

Age	1 9 5 1				1 9 6 6				% C & H to GOI			
	Male		Female		Male		Female		Male		Female	
	C&H	GOI	C&H	GOI	C&H	GOI	C&H	GOI	1951	1966	1951	1966
All ages	182.1	185.9	180.0	175.9	241.4	245.6	238.6	234.0	98	102	98	102
0 - 4	27.9	27.0	27.5	26.6	39.4	39.3	38.6	38.1	103	103	100	101
5 - 9	23.3	22.1	22.3	21.0	31.8	33.3	31.5	31.5	101	106	95	100
10 - 14	20.3	20.2	20.2	19.0	26.7	28.7	26.6	27.1	100	106	93	98
15 - 44	83.7	85.7	81.3	80.3	104.9	103.4	102.5	99.3	98	101	101	103
45 - 64	23.1	24.5	23.4	22.4	31.3	33.4	31.2	29.8	94	104	94	105
65-and over	4.8	6.4	5.3	6.6	7.3	7.5	8.2	8.2	75	80	97	100

The fact that these two projections are so remarkably close does not indicate that they are correct. Coale and Hoover's projection was available to the expert committee that developed the GOI projection. In fact, it would probably have been chosen had there not been the pride attached to developing a GOI projection. Because they are so similar, Coale and Hoover's will be the 1966 projection used hereafter if later projections are required in the discussion.

(continued) S. A. 100

Admission to Class in 1911 and 1912

1911		1912		1913		1914		1915		1916		1917		1918		1919		1920		1921		1922		1923		1924		1925		1926		1927		1928		1929		1930		1931		1932		1933		1934		1935		1936		1937		1938		1939		1940		1941		1942		1943		1944		1945		1946		1947		1948		1949		1950		1951		1952		1953		1954		1955		1956		1957		1958		1959		1960		1961		1962		1963		1964		1965		1966		1967		1968		1969		1970		1971		1972		1973		1974		1975		1976		1977		1978		1979		1980		1981		1982		1983		1984		1985		1986		1987		1988		1989		1990		1991		1992		1993		1994		1995		1996		1997		1998		1999		2000		2001		2002		2003		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		2014		2015		2016		2017		2018		2019		2020		2021		2022		2023		2024		2025		2026		2027		2028		2029		2030		2031		2032		2033		2034		2035		2036		2037		2038		2039		2040		2041		2042		2043		2044		2045		2046		2047		2048		2049		2050		2051		2052		2053		2054		2055		2056		2057		2058		2059		2060		2061		2062		2063		2064		2065		2066		2067		2068		2069		2070		2071		2072		2073		2074		2075		2076		2077		2078		2079		2080		2081		2082		2083		2084		2085		2086		2087		2088		2089		2090		2091		2092		2093		2094		2095		2096		2097		2098		2099		2100		2101		2102		2103		2104		2105		2106		2107		2108		2109		2110		2111		2112		2113		2114		2115		2116		2117		2118		2119		2120		2121		2122		2123		2124		2125		2126		2127		2128		2129		2130		2131		2132		2133		2134		2135		2136		2137		2138		2139		2140		2141		2142		2143		2144		2145		2146		2147		2148		2149		2150		2151		2152		2153		2154		2155		2156		2157		2158		2159		2160		2161		2162		2163		2164		2165		2166		2167		2168		2169		2170		2171		2172		2173		2174		2175		2176		2177		2178		2179		2180		2181		2182		2183		2184		2185		2186		2187		2188		2189		2190		2191		2192		2193		2194		2195		2196		2197		2198		2199		2200		2201		2202		2203		2204		2205		2206		2207		2208		2209		2210		2211		2212		2213		2214		2215		2216		2217		2218		2219		2220		2221		2222		2223		2224		2225		2226		2227		2228		2229		2230		2231		2232		2233		2234		2235		2236		2237		2238		2239		2240		2241		2242		2243		2244		2245		2246		2247		2248		2249		2250		2251		2252		2253		2254		2255		2256		2257		2258		2259		2260		2261		2262		2263		2264		2265		2266		2267		2268		2269		2270		2271		2272		2273		2274		2275		2276		2277		2278		2279		2280		2281		2282		2283		2284		2285		2286		2287		2288		2289		2290		2291		2292		2293		2294		2295		2296		2297		2298		2299		2300		2301		2302		2303		2304		2305		2306		2307		2308		2309		2310		2311		2312		2313		2314		2315		2316		2317		2318		2319		2320		2321		2322		2323		2324		2325		2326		2327		2328		2329		2330		2331		2332		2333		2334		2335		2336		2337		2338		2339		2340		2341		2342		2343		2344		2345		2346		2347		2348		2349		2350		2351		2352		2353		2354		2355		2356		2357		2358		2359		2360		2361		2362		2363		2364		2365		2366		2367		2368		2369		2370		2371		2372		2373		2374		2375		2376		2377		2378		2379		2380		2381		2382		2383		2384		2385		2386		2387		2388		2389		2390		2391		2392		2393		2394		2395		2396		2397		2398		2399		2400		2401		2402		2403		2404		2405		2406		2407		2408		2409		2410		2411		2412		2413		2414		2415		2416		2417		2418		2419		2420		2421		2422		2423		2424		2425		2426		2427		2428		2429		2430		2431		2432		2433		2434		2435		2436		2437		2438		2439		2440		2441		2442		2443		2444		2445		2446		2447		2448		2449		2450		2451		2452		2453		2454		2455		2456		2457		2458		2459		2460		2461		2462		2463		2464		2465		2466		2467		2468		2469		2470		2471		2472		2473		2474		2475		2476		2477		2478		2479		2480		2481		2482		2483		2484		2485		2486		2487		2488		2489		2490		2491		2492		2493		2494		2495		2496		2497		2498		2499		2500		2501		2502		2503		2504		2505		2506		2507		2508		2509		2510		2511		2512		2513		2514		2515		2516		2517		2518		2519		2520		2521		2522		2523		2524		2525		2526		2527		2528		2529		2530		2531		2532		2533		2534		2535		2536		2537		2538		2539		2540		2541		2542		2543		2544		2545		2546		2547		2548		2549		2550		2551		2552		2553		2554		2555		2556		2557		2558		2559		2560		2561		2562		2563		2564		2565		2566		2567		2568		2569		2570		2571		2572		2573		2574		2575		2576		2577		2578		2579		2580		2581		2582		2583		2584		2585		2586		2587		2588		2589		2590		2591		2592		2593		2594		2595		2596		2597		2598		2599		2600		2601		2602		2603		2604		2605		2606		2607		2608		2609		2610		2611		2612		2613		2614		2615		2616		2617		2618		2619		2620		2621		2622		2623		2624		2625		2626		2627		2628		2629		2630		2631		2632		2633		2634		2635		2636		2637		2638		2639		2640		2641		2642		2643		2644		2645		2646		2647		2648		2649		2650		2651		2652		2653		2654		2655		2656		2657		2658		2659		2660		2661		2662		2663		2664		2665		2666		2667		2668		2669		2670		2671		2672		2673		2674		2675		2676		2677		2678		2679		2680		2681		2682		2683		2684		2685		2686		2687		2688		2689		2690		2691		2692		2693		2694		2695		2696		2697		2698		2699		2700		2701		2702		2703		2704		2705		2706		2707		2708		2709		2710		2711		2712		2713		2714		2715		2716		2717		2718		2719		2720		2721		2722		2723		2724		2725		2726		2727		2728		2729		2730		2731		2732		2733		2734		2735		2736		2737		2738		2739		2740		2741		2742		2743		27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A 3.3 Because interest in subsequent appendices centres on what India's population problem is unless some drastic controls are instituted, Table A. 3.3 is restricted to a presentation of Coale and Hoover's high projection adjusted to include Jammu and Kashmir and all of Assam. Data are presented by sex for 1961 to 1986. Age groups have been condensed beginning with age 45.

APPENDIX 4

Land, Capital and Population about 1951.

A 4.0 Introduction. Without question it is very difficult to demonstrate conclusively that at any given time, say 1951, the population, relative to the land and capital available was excessive even if the organization of what was available was extremely efficient. It is even more difficult when many times the officially reported data seem inconsistent and data are not available at all for important items. The principle line of attack here will be an attempt to get evidence for the following statements:

Statement I. The principal industry in India in 1951 was . . . agriculture.

Statement II. The principal expenditure of Indians is on food and the principal diet of Indians consists of foodgrains.

Statement III. India is not self-sufficient in foodgrains.

Statement IV. India would have been self-sufficient in foodgrains about 1951 if its yields were not relatively very low.

Statement V. India's low yields were primarily attributable to exhaustion of the soil, insufficient irrigation and poor farm capital - all requiring high capital expenditures.

Statement VI. A further handicap to India was poor distribution of agricultural holdings.

Statement VII. With more economic agricultural units, many workers could have been released for non-agricultural activities.

Statement VIII. Unfortunately, however, there was a paucity of capital available even for the actual non-agricultural workers, among whom there was much unemployment and under employment.

- Statement IX. It is estimated that it takes about Rs. 3,000 (about 600) of capital on the average to create a new job in small industry. It requires very much more in heavy industry.
- Statement X. The level of income was so low for the vast majority of people that large volumes of savings were unlikely even if the people were well motivated.
- Statement XI. A key deterrent to enhanced savings was the high ratio of dependents to workers, resulting in a very high percentage of food expenditure to total expenditure. Most of these dependents were children.
- Statement XII. Unlike some other countries with a lower number of arable acres per person, the net result was the inability to have sufficiently high general productivity to permit the trade essential to a reasonably good level of living.
- Statement XIII. Capital per worker, if well utilized, is the key to economic progress for India. India was in the unfortunate position in 1951 of having very low capital per worker, one of the highest relative increases in its population in recent history and a very low income for relatively large families. The result was that much of the capital equipment actually created went to maintaining the same low level of living for the added population rather than making relative improvements for a smaller population. As Nehru has said "India must run to stand still".

A 4.1 Evidence for Statement I: The principal industry in 1951 was agriculture. (1) Table A4.1.1 gives the percentage distribution of the total population of India, 357 million, excluding Jammu and Kashmir and part of Assam, by livelihood classes by sex. The class is determined by principal activity.

Thus 70% of the total population of India 1951 was classified as belonging to the agricultural classes. Furthermore 68% of the self-supporting persons, 69% of the non-earning dependents, and 82% of the earning dependents were members of households where the principal activity was agriculture.

That the high dependence on agriculture was very widespread is shown in Table A 4.1.2 which gives the data for both sexes combined by states, according to the 1951 boundaries.

Table A4.1.2. Population of States of India in Agriculture, 1951

State	Population in millions	Population in agricultural classes		Cultivators of land wholly or mainly owned and their dependents.	
		No. in millions	% of total pop.	No. in millions	% of agr. classes
All States (except Jammu & Kashmir and part of Assam)	356.6	249.1	70	167.3	67
Assam	9.0	6.6	67	5.2	79
Bihar	40.2	34.6	86	22.2	64
Bombay	36.0	22.1	61	14.6	66
Madhya Pradesh	21.2	16.1	76	10.5	65
Madras	57.0	37.0	65	19.9	54
Orissa	14.6	11.6	79	8.7	75
Punjab	12.5	8.1	65	4.8	59
Uttar Pradesh	63.2	46.9	74	39.4	84
West Bengal	24.8	14.2	57	8.0	56
Hyderabad	18.7	12.7	68	7.7	61
Madhya Bharat	8.0	5.7	71	4.0	70
Mysore	9.1	6.3	69	5.0	79
PEPSU	3.5	2.5	71	1.7	68

States	Population in millions	Population in agricultural classes		Cultivators of land wholly or mainly owned and their dependents	
		No. in millions	% of total pop.	No. in millions	% of agr. classes.
Rajasthan	15.3	10.8	71	6.6	61
Gujarat	4.1	1.9	46	1.4	74
Travancore-Cochin	9.3	5.1	55	2.4	47
Ajmer	0.69	0.32	46	0.26	81
Bhopal	0.84	0.55	65	0.31	56
Bilaspur	0.13	0.11	85	0.10	91
Coorg	0.23	0.13	57	0.08	62
Delhi	1.74	0.17	10	0.12	71
Himachal Pradesh	0.98	0.91	93	0.83	91
Kutch	0.57	0.24	42	0.16	67
Manipur	0.58	0.48	83	0.41	85
Tripura	0.64	0.48	75	0.38	79
Vindhya Pradesh	3.58	3.11	87	2.24	72
Andaman & Nicobar Islands	0.0310	0.0044	14	0.0041	93
Sikkim	0.14	0.13	93	0.12	92

Source: Statistical Abstract, India, 1953-54, Table 15-A pp. 35-38.

From Table A 4.1.2 it may be seen that every state with 10 million or more population but West Bengal had at least 60% in the agricultural classes, and West Bengal had 57%. Only two states with a million or more population had less than 50% in the agricultural classes and one of those was Delhi, the location of the Central Government. Furthermore only one State, Travancore-Cochin had less than 50% in the class of cultivators of wholly or mainly owned land. Without question, from the point of view of people, India's primary industry is agriculture.

Table A 4.1.3 demonstrates that not only in 1951 but since, agriculture has contributed a large proportion of the national in-

come, but not as large as the proportion of the population in agricultural classes.

Table A 4.1.3 Percentage of India's National Income Originating in Agriculture, 1948-49 to 1953-1954.

Year	National income in billions of rupees		
	Total	Originating in Agriculture	
		Rupees	Percent
1948-49	86.5	42.5	49.1
1949-50	90.1	44.9	49.8
1950-51	95.3	48.9	51.3
1951-52	99.9	49.9	49.9
1952-53	98.6	47.9	48.6
1953-54	106.0	54.0	50.9

Source: Statistical Abstract, India, 1953-54, Appendix D, p.927.

Agriculture, therefore was the main source of livelihood of about 70% of the people and it provided not far from 50% of the national income.

A 4.2. Evidence for Statement II:.. The principal expenditure of diet of Indians consists of foodgrains. Indians is on food and the principal/ Table A4.2 gives the rural consumer expenditure per household, July 1949 to June 1950 for India by regions as reported by the National Sample Survey. Notice that in every zone but the West, at least 60% was spent on food and over one-third of the consumer expenditures were on food grains.

In these reported expenditures, pan, tobacco, and intoxicants are not classified as food. Of the 42 items of expenditure given in the tables, there were only eleven in which expenditures for the rural household for All-India exceeded Rs. 25 per year (about 5 dollars). These were as follows in rupees with the percentage of total in parentheses: food grains, 442.61 (38.7); pulses, 40.89 (3.6); edible oil, 43.31 (3.8); vegetables, 26.72 (2.3); milk and milk products, 88.82 (7.8); spices, 31.00 (2.7); sugar, 29.28 (2.6); fuel and light 37.14 (3.2); men's clothing, 36.01 (3.2); women's clothing, 42.36 (3.7); and cereimonials, 82.46 (7.2). Notice that seven of these items were food, and that among the missing items were children's clothing, furniture, utensils, and house rent and taxes. Within food, notice that meat, eggs and fish were missing.

Without doubt food and within food, food grains, comprise the major expenditure for rural Indian households.

Data on urban consumption are rarer; but in the same National Sample Survey Report, Table G, are given the percentages of total expenditure on foods for 15 industrial areas according to the Labour Bureau, Government of India about 1943 to 1945. While not strictly comparable with the National Sample Survey, they give convincing evidence of the importance of food in industrial centers. The range is from 58.2% spent on food in Jubbulpore to 77.7% in Jharia. No break down is given for food grains; but it is well known that in urban centers the preponderant item is food

grains. G. Borker in his "Health in Independent India" (Government of India, undated but about 1958) says, page 129 "Diet and nutrition surveys have been carried out in the urban and rural areas of different States . . . have shown that the Indian diet is ill-balanced. As 90% of an average Indian meal consists of cereals, it is singularly devoid of many other necessary ingredients . . .". Presumably this means 90% of the calories; but in any event, it supports the contention again that food grains dominate the Indian diet.

A 4.3. Evidence for Statement III. India is not self-sufficient in food grains. On page 157 of the First Five Year Plan (Planning Commission, Government of India, 1952) appears the following statement: "While the population (as of 1951, ed.) has increased by about 39% during the last four decades, the production of foodgrains has not kept pace with it. This indicates an appreciable decrease in per capita availability of foodgrains from internal sources. For more than three decades India has been getting a much larger quantity of grains (mainly rice) from Burma than what it was exporting to other countries. The separation of Burma in 1936 has reduced internal supplies by about 1.3 million tons, and the Partition in 1947 by a further 0.77 million tons. Since 1948 we have been importing large quantities of foodgrains, 2.8 million tons in 1948, 3.7 million tons in 1949, 2.1 million tons in 1950 and 4.7 million tons in 1951 To do away with imports and maintain consumption at the level of 1950, i.e., 13.71 pounds per adult per day, the additional quantity of foodgrains needed in 1956 will be 6.7 million tons. The requirements of

cereals for a balanced diet have been laid down by the Nutrition Advisory Committee at 14 oz. and to raise consumption to this level the additional quantity required is estimated at 7.8 million tons. These figures indicate the magnitude of the problem that lies ahead".

It may be emphasized that the 1956 estimates were based on a total population of 377.6 millions for 1956. From Appendix I it may be observed that the CSO estimate for 1956 is now (1959) 391.4 millions or about 14 million people and 3.7% above the 1952 forecast.

On page 459 of the "First Five Year Plan" appears the following statement: "The effect of the Plan on imports is more difficult to specify commodity-wise It is difficult, in particular, to forecast the precise requirements by way of food imports by the end of the Plan. . . . Provisionally it has been assumed that about three million tons of foodgrains would have to be imported every year in the period of the Plan".

From a study of Tables 252 and 253 of the Statistical Abstract, India, 1953-54 (Government of India, 1956) there is no evidence of an export of food grains in the years 1949-50 through 1953-54. There is evidence of the importation of considerable "grain, pulse, and wheat flour". The values in millions of rupees are given as follows: 1949-50: 1,208; 1950-51: 684; 1951-52: 2,272; 1952-53: 1,552; and 1953-54: 623.

On the other hand "Basic Statistics Relating to the Indian Economy, 1950-51 to 1957-58" (Planning Commission, Govern-

ment of India, December, 1958) give no values for exports and the following values for imports of "cereals" in millions of rupees: 1950-51: 996; 1951-52: 2,314; 1952-53: 1,532; 1953-54: 637; 1954-44: 684; 1955-56: 177; 1956-57: 79; and 1957-58: 598. But in either case, India's recent history has been one of shortage of food grain. Such shortage is further indicated by net food supply, other than alcoholic beverages, available for human consumption in 1954-55, according to the Statistical Office of the United Nations as cited in the Statistical Abstract of the United States, 1957, Table No. 1173. India's value of 1850 calories per person per day is the lowest of the 38 countries listed by over 100 calories per person per day. It is further corroborated by the following statement on pages 259 and 260 of the Second Five Year Plan (Government of India, 1956): "By the end of the second plan the rate of consumption is estimated to rise to 18.3 ounces per adult (cereals 15.5 ounces and pulses 2.8 ounces), so that total food requirements will be 75 million tons. The plan provides for an increase in food production of 10 million tons over the next five years. In terms of calories the per adult consumption of food per day, which at present amounts to 2,200 is expected to increase by 1960-61 to 2,450 as against the minimum of 3,000 calories recommended by nutrition experts". The 2,200 value is high when compared to other sources.

A 4.4. Evidence for Statement IV: India would have been self-sufficient in food grains about 1951 if its yields were not rela-

tively low.

Table 4.4.1 gives the wheat and rice yields in bushels per acre for those countries estimated to have as little arable land per acre as India's for which data were available as of 1949 and 1950. Notice that with the exception of Portugal, 1949 in wheat, India's yield was consistently the lowest. The all-country values, excluding the U.S.S.R. are estimated to be 15.4 bushels of wheat per acre in 1949 and 16.5 in 1950; 32.3 bushels of rice per acre in 1949 and 32.8 in 1950.

Table A 4.4.1. Wheat and Rice yields in Bushels per per Acre* , 1949 and 1950.

Country	Wheat		Rice	
	1949	1950	1949	1950
India	9.5	9.5	23.5	20.1
Austria	25.0	26.1	-	-
Belgium	58.0	46.6	-	-
Egypt	29.0	26.4	78.4	83.8
Germany, West	39.6	38.2	-	-
Indonesia	-	-	32.3	-
Italy	22.0	23.9	-	-
Japan	25.7	26.1	73.5	79.4
Korea, Southern	-	-	60.8	-
Netherlands	63.5	48.1	-	-
Pakistan	13.9	13.9	27.9	27.4
Portugal	9.5	12.8	-	-
Thailand	-	-	27.0	25.5
United Kingdom	41.8	39.3	-	-

* Converted from original Table at 1 metric quintal equals 3.67 bushels of wheat or 4.9 bushels of rice.

• *Journal of the American Medical Association*, 1997; 277: 1033-1037

Source: Data from the International Yearbook of Agricultural Statistics as cited in Woytinski and Woytinski: World Population and Production, Twentieth Century Fund, 1953, Tables 241 and 243.

Table A 4.4.2 gives the yields in bushels per acre of wheat and rice for the years 1950-51 to 1957-58.

Table A 4.4.2 Wheat and Rice Yields in Bushels per Acre*, India, 1950-51 to 1957-58.

<u>Year</u>	<u>Bushels per acre</u>	
	<u>Rice</u>	<u>Wheat</u>
1950-51	9.9	17.9
1951-52	9.7	14.2
1952-53	11.4	15.2
1953-54	11.2	17.9
1954-55	12.0	16.2
1955-56	10.5	17.3
1956-57	10.4	17.8
1957-58	9.6	15.6

* Converted from the original table at 60 pounds equal one bushel of wheat and 45 pounds equals one bushel of rice.

Source: Basic Statistics Relating to Indian Economy. Planning Commission, Government of India, December, 1958, Table 3.4.

The above data on wheat appear to be reasonably consistent with those cited in Table A.4.1; but there is a large discrepancy in rice. This is probably attributable to the fact that one should assume about 45 pounds per bushel of unhusked rice but 60 pounds per bushel of husked rice. The data given in the Planning Commission's document are believed to be for unhusked rice.

In any event, productivity is low in India for both the imported commodities of wheat and rice. In the First Five Year

Plan, cited in A 4.3 above, it was stated that the imports of food grains in millions of tons were as follows: 2.8 in 1948; 3.7 in 1949; 2.1 in 1950; and 4.7 in 1951. From the Statistical Abstract, India, 1953-54, Table No. 144, the total crop yields in India in wheat and rice were in millions of tons; ^{for wheat:} 5.7 in 1948-49; 6.3 in 1949-50; 6.4 in 1950-51; and 6.1 in 1951-52. For rice: 22.6 in 1948-49; 22.2 in 1949-50; 20.3 in 1950-51; 21.0 in 1951-52. If all the imports of food grains were in wheat, the percentage of imports to production of wheat would therefore be approximately as follows: 49% in 1948; 59% in 1949; 33% in 1950; and 77% in 1951. If all the imports were in rice, the percentage of imports to production of rice were therefore approximately as follows: 12% in 1948; 16% in 1949; 10% in 1950; and 22% in 1951.

The maximum increase in productivity in wheat would therefore have to be about 80% assuming that all imports of food grains were in wheat and the maximum for rice would have been about 25% if all food grain imported had been rice. From Tables A 4.4.1 and A 4.4.2 one sees that an increase of 80% to the maximum yield observed for wheat, namely 12.0 bushels, would give a yield required of less than 22 bushels per acre, which yield was exceeded, according to Table A 4.4.1 in 1949 and 1950 by Austria, Belgium, Egypt, West Germany, Japan, Netherlands and United Kingdom. Therefore, yields in wheat alone attained by these countries would have made India self-sufficient in foodgrains.

A comparable study for rice, assuming all food grain imported was rice would require a 25% increase in yield from the

maximum of 23.5 bushels per acre to 29.4 bushels per acre. From the scanty data on rice in Table 4.4.1 one sees that this yield was exceeded in both 1949 and 1950 by Egypt and Japan and by Indonesia and South Korea in 1949 with no data given for 1950.

Since a reasonable increase in productivity for either wheat or rice would have resulted in self-sufficiency in all food grains, it is evident that a low yield per acre in food grains was the chief cause of India's lack of such self-sufficiency.

A.4.5 Evidence for Statement V. India's low yields were primarily attributable to exhaustion of the soil, insufficient irrigation, and poor farm capital—all requiring high capital expenditures.

(1) Exhaustion of the soil

The following extracts are taken from the section on Manures and Fertilizers beginning on page 254 of "First Five Year Plan" (Planning Commission, Government of India, 1952). "A systematic survey of the soils of India has not yet been carried out, though it is generally known that Indian soils are deficient in organic matter, nitrogen and phosphates Indian soils, while deficient in nitrogen and phosphates, are generally rich in potash Tropical soils often lack humus On the basis of the 1951 livestock census the total production of fresh dung is estimated at 800 million tons; however, all this valuable manure does not go back to the land. A large part of it—which may amount to nearly 50 percent—is used as fuel by cultivators(Note: The estimate for 1959 by the compost development

officer of the Ministry of Food and Agriculture is 60% used for fuel). The above estimates do not relate to cattle urine which is rich in nitrogen but mostly goes to waste . . . The utilization of urine, whether human or animal, for manure is of even greater importance than the utilization of nightsoil or dung, as the former provides a much larger proportion of nitrogen. We have not yet developed any efficient and popular system or appliances for utilizing urine as manure In the rural areas the nightsoil and urine are not generally being utilized as manure . . . The export of bones from India has been going on for a long time . . . (In 1951, a total of about 4 million tons of bones have been exported. This export has been criticized on the ground that it deprives the Indian soil of a valuable manurial constituent which should return to it. Indian soils are known to be deficient in phosphates. . . . The fact that fertilizers are in demand today shows that their use . . . is profitable to the cultivators. But their high prices in recent years have resulted in larger quantities being utilized for commercial crops in preference to food crops. Unless, therefore, the prices of fertilizers are substantially reduced so as to be within the reach of the grower of foodgrains, any expansion of the use of fertilizers for food crops will be difficult". In addition to these problems, there is a long section on the problem of increasing soil erosion caused by deforestation, excessive grazing, and lack of contour plowing.

(2) Insufficient irrigation

India is dependent on the vagaries of the monsoons for its rainfall. In 1953-54, seven States had a million or more acres in wheat production: Bihar, Bombay, Madhya Pradesh, Punjab, Uttar Pradesh, Madhya Bharat and Rajasthan. Eleven States had a million or more acres in rice production: Andhra, Assam, Bihar, Bombay, Madhya Pradesh, Madras, Orissa, Uttar Pradesh, West Bengal, Hyderabad and Vindhya Pradesh. (Source: Statistical Abstract, India, 1953-54, Table No. 143). Table A 4.5.2 gives the percentage of irrigated areas in rice and wheat for these States in 1951-52 to the total area in rice and wheat in 1953-54 for these States as well as the percentage total irrigated area under all crops.

Table A 4.5.2 see page 18.

Table A 4.5.2 Percentage of Irrigated area to area under Crops Selected States in India

State	Thousands of Acres of Irrigated Crops 1951-52			Thousands of acres under crops			% of Irrigated area to total		
	Total	Rice	Wheat	Total 1951-52	Rice 1953-54	Wheat 1953-54	Total	Rice	Wheat
Andhra	5,033	3,975	4	15,611	4,500	7	32	88	57
Assam (a)	1,339	1,142	-	5,499	4,180	6	24	27	0
Bihar	4,111	3,064	231	21,500	13,016	1,601	19	24	14
Bombay (a)	2,224	322	433	41,145	3,197	1,995	5	10	22
Madhya Pradesh	1,907	1,634	69	29,434	9,065	2,766	6	18	2
Madras	5,906	3,978	1	15,557	6,378	4	38	62	25
Orissa	2,553	2,131	5	13,996	9,786	12	18	22	42
Punjab	5,620	635	1,737	11,682	579	3,054	48	110(?)	15
Uttar Pradesh	13,975	1,060	4,134	40,609	9,003	9,231	34	12	45
West Bengal (a)	2,493	2,271	26	11,730	10,547	133	21	22	20
Hyderabad	1,875	1,354	48	26,263	1,743	584	7	78	8
Madhya Bharat	514	33	155	10,917	200	1,682	5	17	9
Rajasthan (a)	3,119	43	800	23,622	169	1,874	13	25	43
Uttar Pradesh	216	7	67	4,053	1,180	747	5	1	9
All India	56,464	23,396	8,667	296,387	76,135	24,082	19	31	36

(a) For 1950-51 for first four columns. Assam's total irrigated acres/34,000 acres for which details are not available. includes

Source: Statistical Abstract, India, 1953-54, Tables 142, 143 and 150

These data must be considered very crude estimates. Whether double cropping is counted as one area or two is not clear, for instance. They become more meaningful, if one has an idea of what should be irrigated. Ideas on this may be gained from excerpts from the ^{Year} "Second Five / Plan" (Government of India, 1956). There (p.323) the area irrigated from all sources in 1950-51 is given as 51.5 million acres. The aim (pp.325, 326) was to add 16.3 million acres under irrigation during the first plan (p.325) and 21 million acres under the second plan, with the hope of doubling the area under irrigation in 15 to 20 years (p.325). India therefore has recognized for some time that insufficient irrigation has been utilized.

(3) Poor farm equipment.

Table A 4.5.3 is an attempt to get a picture of the agricultural equipment per cultivated holding. The data will be restricted to those states with 10 million or more net sown acres in 1951-52; but they comprise over 88% of the total. The estimated numbers of land holdings were obtained by dividing the net area sown by the average size of cultivated holdings in acres. Then the equipment per holding was determined. It should be added that the major tools in agriculture are spade-hoes and sickles. It is very rare for a farmer to have such tools as a jack-knife, a hammer, a saw or a chisel. Wheat threshing is commonly done by standing on a board pulled by bullocks over the harvested wheat. Winnowing consists of tossing up the combined wheat and chaff from pans. From the items selected for census purposes and from the values of those items, one sees that capital equipment for agriculture was very scarce.

(4) Capital Cost

Data are not available to indicate how much it would cost to equip the farmers appropriately. One can determine, however, the capital expenditure proposed in the plans for fertilizer and for irrigation.

In "The First Plan" (p. 208) the target of additional production for foodgrains was 7.6 million tons (14.6) made up roughly of 4 million tons of rice, 2 million tons of wheat, 1 million tons of gram and pulses, and 0.5 million tons of other cereals. In Appendix I (p. 217) this target of 7.6 million tons increase is found to be made up of a gross increase of 8.1 million (potential) tons less 0.5 million (potential) tons diverted to commercial crops. The gross addition of 8.1 million (potential) tons was to be attained by the following methods (in millions of tons): from major irrigation, 2.0; from minor irrigation, 2.4; from land reclamation and development, 1.5; from fertilizers and manures, 1.1; from improved seeds, 0.6; and from "community projects and intensive areas", 0.5. Thus, additional irrigation was to add 4.4 million tons and fertilizers and manures were to add 1.1 million tons. The cost of the total program was estimated to be 2.64 billion rupees (p.209). It is difficult to say what the capital cost per additional ton of foodgrains would be for irrigation and fertilizer; but a crude idea may be obtained by observing (p.209) that Rs.360 million were in the supplementary list for minor irrigation and tubewells and the additional foodgrains anticipated from these supplementary expenditures was 1.6 million tons per year. This

works out to be Rs. 225 capital cost per additional annual ton. This slightly exceeds the estimated total annual consumer expenditure per rural person of Rs. 220 as given in the National Sample Survey Report No. 1, Table 6.

In "The Second Five Year Plan", the target for increase in foodgrains was 10 million tons (p. 263) of which rice was to account for 3 to 4 million tons, wheat 2 to 3 million tons; other cereals, 2 to 3 million tons; and pulses, 1.5 to 2 million tons. Major irrigation was to add 24% of the total: minor irrigation 18%; fertilizers and manures 25%; improved seeds, 10%; land reclamation and development 8%; and general improvement in agricultural practices, 15% (p. 268). On page 327, one finds that 14.8 million acres were to benefit from new irrigation projects costing Rs. 3.76 billion, excluding tubewells. This gives a capital cost of Rs. 254 per acre. Assuming a yield of even 15 bushels per acre at 60 pounds per bushel and that these were all new acres, this gives a capital cost of over Rs. 500 per additional ton. For tubewells (p.330), 3,581 tubewells were to cost Rs.200 million and they would irrigate 916,000 acres. This gives a capital cost of about Rs. 220 per acre, or for foodgrains at least Rs.440 per additional ton, again assuming no previous yield on these acres. The cost of capital equipment is therefore high absolutely even though it brings net benefits.

Between 1955 and 1961,^a the consumption of nitrogenous fertilizers was supposed to increase from 610,000 tons to over 1.8

(p.270). 1.8 million tons is million tons/apparently the equivalent of 370,000 tons of fixed nitrogen (p.400) of which the Indian capacity in 1956 was 85,000 tons. Two fertilizer plants were included in the second plan to add to the one plant existing in 1956. Since fertilizer was only one of the products, capital costs cannot be allocated well; but from page 417 it appears that an investment of Rs. 290 million will give a capacity of 187,000 tons of nitrogen. This gives a capital cost of about Rs. 1,550 per ton of capacity, or to be self-sufficient at 370,000 tons, a capital outlay of about Rs. 555 million. This alone would be about 0.5% of the net domestic product^{as} of 1951.

A 4.6. Evidence for Statement VI. A further handicap to India was poor distribution of agricultural holdings.

In Table A 4.5.3 above the average size holdings and the net sown area of the principal states were given. Over 88% of the net sown area was included. Using these states as a major indication of the distribution of land holdings, Table A 4.6 gives an estimate of the percentage of holdings by size and the percentage of sown area by size of holdings.

Table A4.6 Estimated Percentage Distributions of Land Holdings and Cultivated Area by Size, India about 1951.

Size of Holdings in acres	Average Size Holdings in acres	Percentage of		Extreme Percentages (11 States) of			
		Holdings	Net sown acres	Holdings		Net Sown Acres	
				High	Low	High	Low
1.00 or less	0.5	16.9	1.2	31.0	3.3	3.6	0.0
1.1 - 2.5	1.6	22.6	5.1	30.0	7.0	10.5	1.0
2.6 - 5.0	3.5	21.3	10.4	30.0	13.6	23.0	3.0
5.1 - 10.0	7.0	18.9	18.2	26.0	14.3	33.9	8.8
10.1 - 25.0	15.0	15.2	31.6	42.0	7.1	54.0	23.6
25.1 - 50.0	33.9	3.8	18.0	14.7	1.1	30.0	5.8
Over 50.0	89.7	1.3	15.5	5.0	0.1	27.8	3.5
Total	7.2	100.0	100.0				

- Source:
- (1) Estimated numbers of holdings from Table A 4.5.3
 - (2) Net sown area from Statistical Abstract, India, 1953-54 Table 142.
 - (3) Percentage distribution of land holdings, ibid, Table 148

Method:

- (1) Average size holdings equals net sown area divided by holdings
- (2) Percentage of holdings. Estimated total holdings for each state times the percentage distribution within the state gives estimated holdings by size by state. These were added and the percentages were obtained for the totals.
- (3) Percentage of area. Net sown area for each state times the percentage distribution within the state gives estimated area by size of holdings by state. These were added and the percentages were obtained for the totals.
- (4) The 11 states included were: Bihar, Bombay, Madhya Pradesh, Madras, Orissa, Punjab, Uttar Pradesh, West Bengal, Hyderabad, Madhya Bharat, and Rajasthan.

From Table A 4.6 it is evident that the land holding distribution was very poor. Even though these estimates are very crude, they reveal that the majority of the holdings were of less than 5 acres and only about 5 percent of all holdings were of more than 25 acres. Only about 20 percent of the holdings were over 10 acres. Unfortunately, data are not available on fragmentation of holdings; but in addition to this problem of small holdings, it is known that even many small holdings are fragmented; i.e. non-contiguous. Notice, too, that only about one third of the area was in holdings exceeding 10 acres. Since garden farming plays a very small role in India, where foodgrains are emphasized, it is

evident that most of the farmers were trying to operate on holdings whose size would yield relatively little. For example, 10 acres in wheat would be expected to yield about 120 bushels of wheat (see Table A4.4.2) in 1954-55, a good year. At Hapur in 1954, ^{was} ordinary wheat/about the equivalent of \$ 2.10 a bushel. The total value of the crop of a reasonably large farm would therefore be only about \$250 for the year, assuming the farmer got as much as the wholesale price.

A4.7. Evidence for Statement VII. With more economic agricultural units, many workers could have been released for non-agricultural activities.

In Coale and Hoover, (op.cit. p. 116) there is a quotation from W.A. Lewis' "Aspects of Industrialization" (Cairo, 1953) that reads: "In India it is thought that, with the bullocks and plows in common use, 100 acres in grain can provide employment for perhaps 15 persons 'gainfully employed' in agriculture; whereas the average number 'gainfully employed' in India per 100 acres is about 30. Allowing for the fact that some of India's agriculture is more intensive than grain, Indian economists estimate conservatively that a quarter of the rural population is surplus in the sense that its removal from the land would make no difference to agricultural output. This is equivalent to having some 20 million people permanently unemployed".

Further verification of the excess of agricultural manpower is given in the National Sample Survey Report No. 14, "Some Characteristics of the Economically Active Population" (GOI, 1959) in

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Table 9.7 page 83. For surveys taken from December 1952 to August 1953, 38% of the farmers, 43% of the cultivators, 46% of the share croppers, and 64% of the agricultural laborers had less than 20 days work in the 30 days preceding the survey in primary occupation.

The above estimates, even though they are very crude, substantiate the common belief in India that there is a vast under-employment on the farms.

A4.8. Evidence for Statement VIII. Unfortunately, however, there was a paucity of capital available even for the actual non-agricultural workers among whom there was much unemployment and under-employment.

The National Sample Survey Report No. 14 cited above shows about 21% of the urban gainfully employed with less than 20 days of work in the preceding 30 and 10% with less than 10 days work in the primary occupation. Under employment and unemployment were therefore acute without transferring agricultural workers to other jobs.

In addition, one wonders what they would do. The shift to a different kind of industry requires capital even for such jobs as rickshaw men of which there appear to be a great sufficiency already in the major cities. Presumably they would be mostly unskilled laborers; but the National Sample Survey's Report No. 14 shows that about 27% of the unskilled laborers were working at half intensity or less in the preceding 30 days and 4% of the

total had no work (p.87). The average monthly income of all unskilled laborers was less than Rs. 34 (p.93), and even in the manufacture of textiles the average was less than Rs. 51. Peons, cleaners, and scavengers averaged about Rs. 48. It would be quite difficult to move and set one's self up in business under such circumstances, and, in general, there appeared to be an excess supply of people looking for jobs as employees.

Table A4.8 gives the fixed and working capital per "worker"

for every manufacturing industry in India employing 10,000 or more "workers" in factories aided by power with at least 20 employees in a factory. / "Worker", differentiated from "employee" appears to be reasonably close the to/US definition of direct or production worker. It appears that as of 1952, between 2,500 and 18,000 rupees of capital per worker would be required in the main manufacturing industries. For fixed capital, these were between 100 rupees for cement (surprising low) to 11,500 rupees for chemicals per worker. Crudely this is between \$20 and \$2300 per worker. The difference in the use of capital is shown by the fact that in the United States in 1954, expenditures for all operating manufacturing establishments on new capital equipment alone including the purchase of old equipment by merger, amounted to \$518 per production worker (Statistical Abstract of the United States, 1957, Table No, 1015). At roughly five rupees to the dollar, total fixed capital per worker exceeded this value in India in 1952 for only five of the 15 industries: vegetable oils, excluding edible hydrogenated oils; paper and paperboard, chemicals; aluminium, copper, and brass; and iron and steel. Capital equipment per worker was therefore very scarce.

A4.9 Evidence for Statement IX: It is estimated that it takes about Rs. 3000 (about \$600) of capital on the average to create a new job in small industry. It requires very much more in heavy industry.

The following statement appeared in a document called "Certain Dimensional Hypotheses Concerning the Third Five Year Plan" produced by the Perspective Planning Division of the Planning Commission, Government of India, in late 1958: "Investment per worker may be taken as Rs. 250,000 for power; Rs. 80,000 in capital intensive industries (such as steel, fertilizers, intermediates for drugs and dyes, machine building, heavy electricals); Rs. 15,000 for mining (including oil) and for large scale, less capital intensive producer and consumer goods. Investment per worker is only Rs. 3,000 in reasonably productive small scale industries (such as are being organized in the industrial estates at Okhla, Guindy, etc.)." It is interesting to note that the proposal for the third plan assumed an average of Rs. 16,333 new investment per added employee with the following distribution:

Sector	Investment in Billion of Rupees	New Employ- ment	Investment in thousand rupees per new employee
Power	1.4	6,000	233
High capital	2.0	25,000	80
Other large scale	2.0	133,000	15
Mining	0.6	40,000	15
Small scale	0.6	200,000	3
Total	6.6	404,000	16

These values for 1959 are considerably higher than those found in Table A4.8 for 1952. How much of the difference is attributable to a difference in kind and how much is attributable to a rise in prices is unknown. But this represents the current Planning Commission thinking.

A4.10 Evidence for Statement X: The level of income was so low for the vast majority of the people that large volumes of savings were ^{even} unlikely/if the people were well motivated.

Table A4.10.1 gives the returns on income-tax for the year ending March 31, 1954 by income size class. All persons or Hindu joint families were subject to ~~tax~~ if their income exceeded Rs. 1,500; but special allowances were made to joint Hindu families with an income of Rs. 8,400 or less/^{and} to all others with an income of Rs. 4,200 or less. According to the table, the net income must be tabulated before these allowances. In 1953, the national income was estimated at Rs. 106 billion. The total income reported by the 478,000 assesses was Rs. 4471 million, or less than five percent of the national income. Yet presumably these persons are to do most of the individual savings. Notice that if all the Rs. 4471 millions reported ~~were~~ to be saved, it would amount to less than one billion dollars. Even allowing for very marked evasion, the savings potential of the rich people seems low relative to the need.

Table A4.10.2 gives the distribution by expenditure classes of two sets of data that unfortunately are not quite comparable. The rural data, referring to April-June, 1951 are by households. The urban data, referring to September 1953, are by persons in the house-

hold expenditure class. If all household classes had the same size on the average, the two would be comparable except for data. Both sets are from the National Sample Survey. From Table A4.10.2, one observes that 93% in both urban and rural had monthly household expenditures of 300 rupees or less. Over half in each case had 100 rupees per month or less. One should assume that this was an expenditure for about 5 persons on the average. The savings potentiality was thus very low.

Table A4.10.1 continued on page 33.

Table A4.10.2 Percentage Distribution of Rural Households and Urban Persons by size of Monthly Expenditure per Household, India.

Monthly Household Expenditure in Rupees	Percentage of Rural Households April-June 1951		Percentage of Urban Population, September 1953.	
	Actual	Cummulative	Actual	Cummulative
50 or less	20.4	20.4	24.3	24.3
51-100	31.2	51.6	36.1	60.4
101-200	31.5	83.1	25.2	85.6
201-300	9.5	92.6	7.8	93.4
301-500	5.1	97.7	4.2	97.6
501-1000	1.9	99.6	1.1	98.7
Over 1,000	0.4	100.0	0.5	99.2
Not recorded	-		0.8	100.0
Total	100.0		100.0	

Source: (1) Rural: Second Round of National Sample Survey as reported in India, 1957, Government of India, Table LX. There were 10,870 sample households in the survey.

(2) Urban: The National Sample Survey Report No. 8, Preliminary Survey on Urban Unemployed, September 1953, Government of India Table 7. There were 20,405 persons covered in the survey, which refers to all Towns in India with over 50,000 population except the cities of Calcutta, Bombay, Madras, and Delhi.

A4.11 Evidence for Statement XI: A key deterrent to enhanced savings was the high ratio of dependents to workers, resulting in a very high percentage of food expenditures to total expenditures. Most of these dependents were children.

It is very difficult to get comparable figures for dependency ratios. The fairest comparison is undoubtedly based on age alone;

although there are vast differences in the goodness of reporting by age and differences in customs with respect to child and female labor. The approach, however, will be to get a percentage of those under age 15 and age 65 and over to the population aged 15-64. Comparisons will be made with all countries for which there are data that had, about 1950, as little arable land per person as India plus the United States for the sake of interest. Table A4.11 gives the results.

Notice that three of these countries, for which arable land is actually less per person than in India, had less than 50% as many in the normal dependency age as in the normal working age: Belgium, Western Germany and Switzerland. All these countries are highly developed, and it will be a major thesis of this report that the relatively low dependency ratio is a great aid; because it makes savings, investment, and capital formation easier. In addition to the United States, which does not have an arable land problem relative to India, five more countries had dependency ratios of less than 60%; Austria, Netherlands, Norway, Portugal, and United Kingdom. Of these, all but Portugal would be classified as reasonably highly developed to very highly developed. No country on the list with more than 60% dependency ratio would be so classified. Probably the highest in the group would be Ceylon, Japan, and Puerto Rico, of which Puerto Rico alone had a considerably higher dependency ratio than India. To offset this handicap relative to India, Puerto Rico had a net income of 706 million dollars or more than \$300 per capita (Statistical Abstract of the US 1957, Table No.1167) in 1951 compared with India's approximately \$50 per capita. The

TABLE A4.11

Dependency Percentages Based on Age for Selected Countries, About 1951

Country	Year	% of Stated Population							
		Population in Millions, Age				to that Age 15-64			
		Under 15	Over 65	Under 15 and Over 65	Under 15 and Over 44	Under 15	Over 65	Under 15 and Over 65	Under 15 and Over 65
United States	1950	40.5	12.3	52.8	97.9	41.4	12.6	53.9	
India	1951	135.9	13.0	148.9	212.9	63.8	6.1	69.9	
Austria	1951	1.59	0.73	2.32	4.61	35.5	15.8	50.3	
Belgium	1947	1.75	0.91	2.66	5.85	29.9	15.6	45.5	
Bolivia	1950	1.07	0.12	1.19	1.52	70.4	7.9	78.3	
Ceylon	1946	2.48	0.23	2.71	3.95	62.8	5.8	68.6	
Dominican Republic	1950	0.95	0.06	1.01	1.13	84.1	5.3	89.4	
Egypt	1947	7.20	0.59	7.79	11.12	64.7	5.3	70.1	
El Salvador	1950	0.76	0.05	0.81	1.04	73.1	4.8	77.9	
Germany, Western	1950	11.24	4.42	15.66	32.04	35.1	13.8	48.9	
Japan	1950	29.43	4.11	33.54	49.66	59.3	8.3	67.5	
Korea, South	1949	8.39	0.6 ^a	9.0	11.13 ^a	75.4	5.5	80.9	
Netherlands	1947	2.82	0.68	3.50	6.12	46.1	11.1	57.2	
Norway	1950	0.80	0.32	1.12	2.16	37.0	14.8	51.9	
Panama, Non-indigenous	1950	0.31	0.03	0.34	0.42	73.8	7.1	81.0	
Portugal	1950	2.49	0.59	3.08	5.36	46.5	11.0	57.5	
Puerto Rico	1950	0.95	0.09	1.04	1.17	81.2	7.7	88.9	
Switzerland	1950	1.11	0.45	1.56	3.15	35.2	14.3	49.5	
Thailand	1947	7.38	0.45	7.83	9.61	76.8	4.7	81.5	
United Kingdom	1951	11.33	5.47	16.80	33.43	33.9	16.4	50.3	
Venezuela	1950	2.11	0.13	2.24	2.79	75.6	4.7	80.3	

^a/ Partially estimated.

Sources: Demographic Yearbook of the United Nations, 1955, Table 10, except for India. For India, CSO in Appendix II, in

here
thesis represented/is that to improve the development status of any country, savings eventuating in increased effective capital per worker are required. For any given level of per capital income, increased savings are handicapped by a high dependency ratio. For a country with a very low per capital income to start with, a high dependency ratio is an overwhelming burden; because a high proportion of the national effort must be devoted to bare subsistence.

From Table A4.11 it may also be observed that there are marked variations in the dependency ratios for young and for old people. The underdeveloped countries have high ratios for those under age 15; the developed countries have high ratios for those age 65 and over. For example, 91% of India's population in the normally dependent ages is young; compared with only 67% for the United Kingdom. One may speculate that this is to India's advantage; because these young are still to go through the productive ages. Actually, as will be seen later, that depends on the burden of dependency to be put on them when they get to the productive ages.

Reference is again made to Section A4.2, where there was evidence that about two thirds of India's consumption expenditures were on food, exclusive of pan, tobacco, and alcoholic beverages. It is estimated that in 1950 in the United States, less than 33% of the personal consumption expenditures were on food, including tobacco and alcoholic beverages. (Statistical Abstract of the United States, 1957; Table No. 867).

A4.12 Evidence for Statement XII: Unlike some other countries with a lower number of arable acres per person, the net result was the inability to have sufficiently high general productivity to permit the trade essential to a reasonably good level of living.

Of the factors of production, land, labor, capital, and management, only land is presumably fixed in the sense that a country's boundaries must be assumed to be unchanged in any study such as this. It is true that the permanent status of Kashmir is in dispute and that there are minor adjustments from time to time; but general conclusions based on land areas should be reasonably valid.

A critical value is the estimated amount of arable land per person. The following is a summary list of all countries believed to have as little or less arable land per acre than India's about 1950. Data on arable land, 1947-49, is based on the United Nation's Yearbook of Food and Agricultural Statistics as cited in the Woytinski and Woytinski's "World Population and Production" (Twentieth Century Fund, 1953) Table 216. Population estimates are taken from Table 3 of the Demographic Yearbook of the United Nations, 1955.

Group 1. Less 0.25 arable acres per person: Japan, Anglo-Egyptian Sudan, and Nyasaland.

Group 2. 0.25 to 0.44 arable acres per person: Bolivia, Switzerland, Netherlands, Belgium, Egypt, United Kingdom, Indonesia, Korea, Panama, Italy, and probably (Communist) China.

Group 3. 0.45 to 0.64 arable acres per person: Puerto Rico, Western Germany, Columbia, Peru, Ceylon, Austria, El Salvador, Norway and Thailand.

Group 4. 0.65 to 0.85 arable acres per person: Pakistan, Kenya, Venezuela, Gold Coast, (probably) Portugal, Dominican Republic, Ruandi-Urundi, and India.

All told there were 31 countries, including India, that appeared to have as bad or as a worse arable land problem than India. If the total arable land in the world is taken as 33,381 million acres as of about 1950 (Woytinski & Woytinski, Table No. 215) and the population of the world is taken as about 2,504 millions (Dem. Yearbook, 1955, Table 2), these 31 countries had about 2.3% of the arable land and about 56.5% of the total population. Nevertheless, the countries in this list run the gamut from about the highest developed to the least developed. Why?

It is obvious from the list that land, and even low arable land per person, is no necessary deterrent to development. Furthermore, a large arable country would normally be expected to have enough diversity of resources, including climate, to provide internal wants to a large degree. Only three

countries on this list have as much as 10% of the arable land of the United States: India, China, and Pakistan, and all three are near the bottom from the point of view of real per capita income. Is not the answer to the differences in these countries development status to be found in trade?

Unfortunately, we do not have good measures of total trade, internal and external, for these countries. For some, but not all of them, one can get crude measures of external trade in dollars of merchandise exports and imports per capita. Even this excludes services, which are so important to countries like United Kingdom, Norway, and Switzerland. Nevertheless, Table A4.12 gives an estimate of such trade per capita for all countries listed above for which data are available. They are listed in the approximate order of arable acres per capita, from low to high. Notice that every country with \$200 or more per capita would be classified as highly developed; Switzerland, Netherlands, United Kingdom, Belgium, Western Germany, and Norway. Every one under \$25 would be classed as very undeveloped; Indonesia, South Korea, Thailand, Pakistan and India. Whether foreign trade per capita is a cause or a result of development, development and trade appear to be highly associated. Trade implies being able to supply something that foreigners want at a presumably competitive price. This requires a high level of productivity, which, as in the case of Kuwait, may be a gift of nature; but generally it implies capital and or special skills.

Table A 4.12 Crude Estimates of Merchandise Imports and Exports per Capita in Dollars, about 1955, for Selected Countries.

Country (ranked in approximate order of arable acres per capita, low to high)	Year	Dollar Exports plus Imports in millions.	Estimated Population in millions	Dollar Exports plus Imports per Capita.
Japan	1955	4,482	83.9	50
Bolivia	1955	179	3.2	56
Switzerland	1955	2,796	5.0	559
Netherlands	1955	5,895	10.7	551
Belgium	1955	5,606	8.9	630
Egypt	1955	922	23.2	40
United Kingdom	1955	18,695	51.0	367
Indonesia	1955	1,535	82.3	19
Korea, South	1948	222	19.9	11
Panama	1955	95	0.9	106
Italy	1955	4,563	47.8	95
Germany, Western	1955	11,928	50.0	239
Columbia	1955	1,255	12.7	99
Peru	1955	568	9.4	60
Ceylon	1955	714	8.6	83
Austria	1955	1,586	8.9	178
El Salvador	1955	199	2.2	90
Norway	1955	1,723	3.4	507
Thailand	1947	209	20.3	10
Pakistan	1955	691	81.0	9
Venezuela	1955	698	5.8	120
Portugal	1955	683	8.8	78
Dominican Republic	1955	213	2.4	89
India	1955	2,570	382.0	7

Sources for Table A4.12. Dollar Exports plus imports from Statistical Abstract of the United States, 1957, Table No. 1177. Population from the 1955 Demographic Yearbook of the United Nations, Table 3, with some arithmetic extrapolations.

A4.13 Evidence for Statement XIII: Capital per worker, if well utilized, is the key to economic progress for India. India was in the unfortunate position in 1951 of having very low capital per worker, one of the highest relative increases in its population in recent history, and a very low income for relatively large families. The result was that much of the capital equipment actually created went to maintaining the same low level of living for the added population rather than making relative improvements for a smaller population. As Nehru has said, "India must run to standstill".

In A 4.5 above, evidence has been given of the scanty capital equipment in agriculture. Table A 4.12.1 gives some additional evidence on the generally poor state of capital in India about 1955. The data given are by no means those we would like to be able to give; but of those available, they are perhaps reasonably illustrative of the state of affairs for those countries with as little or less arable land per capita than India's. Again the order is in terms of arable land per acre. Marked differences appear from country to country in the three measures given; but in general the countries are quite consistent in their standing.

Per capita consumption of sources of energy in equivalent short tons of coal may be taken as a crude index of the use of capital. Norway's apparent per capita consumption is nearly 150 times

Thailand's and 45 times India's. Per capita consumption of steel is a crude index of new capital formation. Data from six countries are lacking; but West Germany's value is 100 times Pakistan's and over 50 times India's. Persons per telephone is a crude measure of the use of capital in communication, assuming that all telephone systems are equally efficient, which they are not. Thailand and Pakistan have about 450 times as many persons per telephone as Switzerland, and India has about 400 times as many as Switzerland.

From these measures one must infer that there was very low capital per worker in India.

Table A4.12.1 Per Capita Consumption of Energy in Equivalent Tons of Coal, Steel Consumption in Pounds per Capita, and Persons per Telephone. Selected Countries, about 1955.

Country ranked in approximate order of arable acres per person.	Per Capita Consumption of Energy in Equivalent short tons of coal	Steel Consumption in Pounds per capita	Persons per Telephone
Japan	1.10	181	28
Bolivia	0.18	?	267
Switzerland	3.16	505	4
Netherlands	2.45	518	10
Belgium	4.53	644	10
Egypt	0.25	31	54
United Kingdom	5.39	809	7
Indonesia	0.10	?	1,112
Korea, South	0.16	?	512
Panama	0.43	?	46
Italy	1.16	260	22

Country ranked in approximate order of arable acres per person.	Per Capita Consumption of Energy in Equivalent short tons of coal.	Steel Consumption in Pounds per capita	Persons per Telephone
Germany, Western	3.86	904	13
Columbia	0.52	60	77
Peru	0.34	31	147
Ceylon	0.11	13	307
Austria	2.42	401	14
El Salvador	1.50	?	219
Norway	5.89	549	6
Thailand	0.04	37	1,845
Pakistan	0.05	9	1,841
Venezuela	2.23	240	55
Portugal	0.40	71	34
Dominican Republica	0.19	?	219
India	0.13	16	1,647

Source: Statistical Abstract of the United States, 1957. Tables 1177, 1178 and 1182 for consumption of sources of energy in equivalent short tons of coal, steel consumption in pounds per capita, and telephones in use. 1955 Demographic Yearbook of the United Nations, Table 3 for population. Arithmetic extrapolation was used in some instances.

Unfortunately, we have no good data on general capital utilization; but many participant training programs of ICA bear testimony to the belief that efficient use and maintenance of capital needs strengthening markedly in India.

Census Paper No. 1, 1957, Government of India data on the population of India since 1901 for the present total boundary by new

(1957) boundaries of States. Jammu and Kashmir and part of Assam are not included. Table A4.12.2 gives the data.

Table A 4.12.2 Census Population of India, Present Boundaries, 1901-1951 (Excluding Jammu and Kashmir and part of Assam)

Year	Population in Thousands	Increase in Population during Previous Decade		
		Persons in Thousands	Percent per Decade	Percent per Year
1901	235,479			
1911	248,995	13,516	5.7	0.56
1921	248,121	- 874	-0.4	-0.04
1931	275,468	27,347	11.0	1.05
1941	314,805	39,337	14.3	1.34
1951	356,879	42,074	13.4	1.26

Source: Census of India, Paper No. 1 General Population Tables and Summary. Figures by Districts of Reorganized States - 1951 Census. Government of India, Table A-II.

Although the rates appear lower in the 1941-51 decade than in 1931-41 decade, two events lead to the belief that the 1941-51 values must have been about the highest on record to have given such a high census increase over 1941. Although direct losses from the war were few in India, indirect losses because of the 1943 Bengal famine are estimated to have taken between 1.5 and ³/million lives (Kingsley Davis: The Population of India and Pakistan, Princeton University Press, 1951, p. 41). Furthermore, as a result of partition in 1947 and the migration of millions of people accompanied by mass slaughter, it is estimated that one million people died (ibid, p.197). It seems likely, therefore, that by 1949 the increase in the rate of growth of the population now being observed (see appendix II) must have started.

Evidence of large family prevalence, over 5 on the average for rural families is presented in Table A4.2 above. That there appears to be little difference between urban and rural situations is shown in the National Sample Survey between urban and rural situations is shown in the National Sample Survey Report Number 7 on Couple Fertility, where the number of children born per couple after 22 years of marriage is 5.92 for rural and 5.86 for urban (Table 6.4).

Evidence of low income is given in Table A4.10.2, where 93% of both rural and urban households had expenditures of 300 rupees per month or less and over half had 100 rupees or less expenditure per month.

For evidence that much of the new capital equipment had to go for increased population, the following quotation is given from page 48 of the First Five Year Plan (Government of India, 1952): "The data available in India for an analysis of output and consumption requirements by different sectors are altogether inadequate Some rough estimates have been attempted for this purpose These estimates place India's national income in 1950-51 at around Rs. 9,000 crores. Of this, the savings available for net investment were probably not much more than Rs. 450 crores. The Five Year Plan is roughly estimated to raise the national product by about Rs. 1000 crores by the end of the five years. Over one half of this increase will be absorbed by the needs of the increase in the population in the meanwhile. It is clear, therefore, that if capital formation from out of domestic

recourses is raised by 50 percent in the course of this period
i.e., from about Rs. 450 crores in 1950-51 to Rs. 675 crores by
1955-56, it would in effect be taking away about half of what is
left over from the increase in the national product for raising
standards of living". (Emphasis supplied). It may be added that
this statement was written when it was believed that the population
was going up only by about 1.25% per year, which now appears to
have been a bad understatement. Furthermore, in the plan itself
(p.12), the whole philosophy is expressed as follows: "The pace
of economic development depends on a variety of factors which
constitute the psychological and sociological setting within
which the economy operates. A major element in this setting is
the community's will to progress and its readiness to develop and
adopt new and more efficient methods and processes of production.
Basically, development involves securing higher productivity all
round and this is a function of the degree of technological ad-
vance the community is able to make Given these basic
conditions of rapid and sustained progress, institutional as well
as others, the key to higher productivity and expanding levels of
income and employment lies really in stepping up the rate of capi-
tal formation. The level of production and the material well being
a community can attain depends, in the main, on the stock of capital
at its disposal, i.e. on the amount of land per capita and of pro-
duct equipment in the shape of machinery, buildings, tools and im-
plements, factories, locomotives, engines, irrigation facilities,
power installations and communications".

1. The first part of the document is a list of names and addresses of the members of the committee. The names are listed in alphabetical order, and the addresses are listed below each name. The list is as follows:

Name	Address
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APPENDIX 5

DISTRIBUTION OF SKILLS AND ATTITUDES OF THE INDIAN PEOPLE, 1951

A5. Introduction: It would be vain to attempt to have a detailed picture of the skills and attitudes of the Indian people as of 1951. Nor is it valid to maintain that there is a one-to-one correspondence between skills and formal schooling. As a matter of fact, most Indians attain their skills by apprenticeships, and the demand for Indian textiles and handicraft products of ivory, brass, and copper attest to the fact that those skills are present among some workers in India. Nevertheless, for the modern society that India is trying to develop, one can get some idea on skills and attitudes from data. In the sequel, evidence will be given for the following statements that are believed to be pertinent to statement 5 in the main report.

Statement I: Because a modern society requires a broad distribution of the ability to read and write instructions, the high illiteracy rate of India as of 1951 and the low proportion attending school showed a lack of such general skill .

Statement II: Whether literate or not, India had and has a very low proportion of its actively engaged workers in the class of skilled workers.

Statement III: An indication of attitude in a progressive society is the mobility of the population. What evidence there is indicates that, except for migration for religious and political reasons, there is relatively little migration in India and relatively little occupational mobility between generations.

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A 5.1 Evidence for Statement I: Because a modern society requires a broad distribution of the ability to read and write instructions, the high illiteracy rate of India as of 1951 and the low proportion attending school showed a lack of such general skill. Table A 5.1.1 gives information in the 1951 literacy rate by 1957 State boundaries.

TABLE A5.1.1

PERCENTAGE OF LITERATE POPULATION BY SEX BY
1957 BOUNDARIES, INDIA, 1951, BY STATES
(Including Jammu and Kashmir, Sikkim, and part
of Assam)

State or Territory	Literate Population (In Millions)			Total Population (In Millions)			% Literate		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
India	59.25	45.60	13.65	356.74	183.26	173.48	16.6	24.9	7.9
Andhra Pradesh	4.10	3.10	1.01	31.26	15.74	15.52	13.1	19.7	6.5
Assam	1.63	1.30	0.33	9.04	4.81	4.23	18.1	27.1	7.8
Bihar	4.71	3.99	0.73	33.78	19.49	19.29	12.1	20.5	3.8
Bombay	10.45	7.87	2.58	48.27	24.82	23.44	21.6	31.7	11.0
Kerala	5.54	3.37	2.17	13.55	6.68	6.87	40.9	50.4	31.6
Madhya Pradesh	2.56	2.15	0.41	26.07	13.26	12.82	9.8	16.2	3.2
Madras	6.24	4.73	1.50	29.97	14.93	15.04	20.8	31.7	10.0
Mysore	3.74	2.87	0.87	19.40	9.87	9.53	19.3	29.1	9.2
Orissa	2.31	1.93	0.33	14.65	7.24	7.40	15.8	27.3	4.5
Punjab	2.46	1.83	0.63	16.13	8.69	7.45	15.2	21.0	8.5
Rajasthan	1.43	1.20	0.23	15.97	8.31	7.66	9.0	14.4	3.0
Uttar Pradesh	6.33	5.75	1.07	63.22	33.10	30.12	10.8	17.4	3.6
West Bengal	6.32	4.83	1.49	26.30	14.11	12.20	24.0	34.2	12.2
Andaman & Nicobar Islands	0.01	0.01	0.00	0.03	0.02	0.01	25.8	34.2	12.3
Delhi	0.67	0.42	0.24	1.74	0.99	0.76	36.4	43.0	32.3
Himachal Pradesh	0.09	0.07	0.01	1.11	0.58	0.53	7.7	12.6	2.4
Laccadive, Minicoy and Aminidive Islands	0.00	0.00	0.00	0.02	0.01	0.01	15.2	25.6	5.3
Manipur	0.07	0.06	0.01	0.58	0.29	0.29	11.4	20.8	2.4
Tripura	0.10	0.07	0.03	0.64	0.34	0.30	15.5	22.3	8.0

Sources: India, 1957, Table XX and Census Paper No. 1, 1957, Table A III.
The percentages are based on the detailed tables.

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An idea of the handicap implied by these figures is shown by the fact that in the United States, disregarding non-responses, there were 61.8 million who, in 1950, were 25 years of age and over and had completed at least 8 years of school. (Stat. Abst. of the U.S., 1957, Table 135). This is 2.5 million more than there were in India in 1951 who claimed that they could at least read and write a simple sentence.

Estimates are given in the Second Five Year Plan of the percentage of children in elementary school in 1950-51 (p. 503). These are reproduced in the brief table below.

TABLE A 5.1.2

ESTIMATED PERCENTAGE OF CHILDREN IN
ELEMENTARY SCHOOL, INDIA, 1950 - 51

<u>Percentage of Children in School</u>				
<u>Stage</u>	<u>Age</u>	<u>Total</u>	<u>Male</u>	<u>Female</u>
Primary	6-11	42	59	25
Middle	12-14	14	22	5
Total Elementary	6-14	32	46	17

Source: Second Five Year Plan, GOI, 1956, p. 503.

The following quotation is given from the same page, "an aspect of the situation which causes concern is the wastage which exceeds 50 per cent at the primary stage. Thus out of 100 pupils who join the first class at school scarcely 50 reach the fourth class, the rest dropping out before completing four years at school, which is regarded as the minimum period for providing permanent literacy. The wastage is greater in the case of girls." (Emphasis supplied).

1. The first part of the paper is devoted to the study of the

properties of the function $f(x)$ defined by the equation

$$f(x) = \int_0^x \frac{1}{1+t^2} dt$$

It is shown that the function $f(x)$ is continuous and

differentiable on the interval $(-\infty, \infty)$ and that its

derivative is given by the formula

$$f'(x) = \frac{1}{1+x^2}$$

It is also shown that the function $f(x)$ is bounded on the

interval $(-\infty, \infty)$ and that its range is the interval

$(0, \pi/2)$.

2. The second part of the paper is devoted to the study of the

properties of the function $g(x)$ defined by the equation

$$g(x) = \int_0^x \frac{t}{1+t^2} dt$$

It is shown that the function $g(x)$ is continuous and

differentiable on the interval $(-\infty, \infty)$ and that its

derivative is given by the formula

$$g'(x) = \frac{x}{1+x^2}$$

It is also shown that the function $g(x)$ is bounded on the

interval $(-\infty, \infty)$ and that its range is the interval

$(-\pi/4, \pi/4)$.

It is also shown that the function $g(x)$ is odd and that

its graph is symmetric with respect to the origin.

The third part of the paper is devoted to the study of the

properties of the function $h(x)$ defined by the equation

$$h(x) = \int_0^x \frac{1}{1+t^4} dt$$

A5.2 Evidence for Statement II: Whether literate or not, India had and has a very low proportion of its actively engaged workers in the class of skilled workers.

Good data on skilled workers is very scanty. Some piecemeal evidence can be given. Even though the percentage of children in school was very low, the percentage of untrained teachers was 41.4% in primary schools and 46.4% in secondary schools (The First Five Year Plan, p. 523). This must have reflected on the quality of the teach^{ing} for a large proportion of the few children in school. In the same document (p. 490), a comparison is given with the United Kingdom on health personnel. The Indian data are taken from the Bhore Report as of about 1947. The following brief table is reproduced:

The Proportion of Medical Personnel to Population

<u>Medical Personnel</u>	<u>India</u>	<u>United Kingdom</u>
1 Doctor	6,300	1,000
1 Nurse	43,000	300
1 Health Visitor	400,000	4,710
1 Midwife	60,000	618
1 Dentist	300,000	2,700
1 Pharmacist	4,000,000	to 3 doctors

On page 527, the further general comment appears: "The absence of adequate facilities for technical and vocational education results in a much larger number of students going in for general education than is justified by the requirements of the country or the tasks and aptitudes of the pupils. The undue

Figure 1 consists of 12 bar charts arranged in a 2x6 grid. Each chart shows the percentage of respondents for a specific category across six age groups: 18-24, 25-34, 35-44, 45-54, 55-64, and 65+. The categories are: 1. I am a member of a political party, 2. I am a member of a trade union, 3. I am a member of a religious organization, 4. I am a member of a social club, 5. I am a member of a sports club, 6. I am a member of a professional association, 7. I am a member of a community organization, 8. I am a member of a volunteer organization, 9. I am a member of a political party, 10. I am a member of a trade union, 11. I am a member of a religious organization, 12. I am a member of a social club. The charts show varying levels of membership across age groups, with some categories showing higher membership in older age groups and others in younger age groups.

emphasis on the academic and theoretical aspects of education retards the development of the practical sense, initiative and resourcefulness among large numbers of students. One result of this is that educated people tend to depend too much on employment by government or commercial concerns, which can absorb only a limited number."

On page 549, there is a discussion of Engineering and Technology. In 1951, there were about 5,100 engineering and technology students admitted and 2,800 graduated. In addition there were about 6,500 admitted to diploma or certificate courses for training supervising personnel and about 2,800 completed the work. This may be compared with over 22,500 receiving their first level degrees in engineering in the United States in 1955, nearly 4,500 getting second level degrees, and nearly 600 receiving their doctorates. (Statistical Abstract of the United States, 1955, Table 160).

One other bit of evidence will be presented, based on National Sample Surveys covering 20,891 persons in 1953-54. Table A. 5.2 gives very crude estimates of the percentage distribution of the gainfully employed by sex for all India. Without knowing much more about the classification than is given in the report, little can be said except at the extremes. Certainly one would classify as unskilled workers, peons, cleaners, scavengers, agricultural labour, and unskilled labour. These comprise 22.23% of the actively engaged males, 34.85% of the females, and 26.29% of the total. At the other extreme, one might put as skilled workers those in medical work, teaching, administrative and

technical work, supervisory work on plant and machinery, farmers and wholesale and financial operators. These comprise 3.43% of the males, 3.39% of the female, and 6.39% of the total. Doubtless the figures for unskilled workers are better than those for skilled. For example, how should operatives and artisans, cultivators, manufacturers of textiles, and building industry workers be classified. Where are all the clerks listed, many of whom would be called unskilled, except for education? The evidence is weak, but it is the best available.

TABLE A.5.2

PERCENTAGE DISTRIBUTION OF GAINFULLY EMPLOYED POPULATION IN
OCCUPATION GROUPS BY SEX, ALL-INDIA, NSS 7TH ROUND (1953-54)

NO.	OCCUPATION	NUMBER OF PERSONS IN SAMPLE	PERCENTAGE OF TOTAL		
			MALE	FEMALE	TOTAL
1.	Medical work	53	0.23	0.20	0.22
2.	Teaching	112	0.56	0.50	0.54
3.	Administrative and technical work	528	3.52	0.49	2.55
4.	Peon, cleaner, scavenger	481	2.68	1.37	2.26
5.	Supervisory work on plant and machinery	7	0.05	----	0.03
6.	Operatives and artisans	1,169	6.84	3.14	5.65
7.	Washerman, barber, cook	343	1.67	1.98	1.77
8.	Sub-total (1-7) services and related occupations	2,693	15.55	7.68	13.02
9.	Farmer	653	3.38	2.11	2.97
10.	Cultivator	9,039	41.40	40.58	41.14
11.	Share-cropper	913	4.84	3.32	4.35
12.	Agricultural labour	4,098	16.73	30.05	21.01
13.	Forestry, fishery, livestock workers	1,387	7.31	5.21	6.64
14.	Agricultural and related occupations (9-13)	16,090	73.66	81.27	76.11
15.	Manufacturer of food products	307	1.19	2.32	1.55
16.	Manufacturer of textiles	351	1.46	3.57	2.14
17.	Building industry worker	117	0.76	0.12	0.55
18.	Manufacturer and building industry worker (15-17)	775	3.41	6.01	4.24
19.	Hawker	164	1.00	0.56	0.86
20.	Retailer	458	2.82	0.96	2.22
21.	Wholesaler and financial operator	119	0.74	0.09	0.53
22.	Sales (19-21)	741	4.56	1.61	3.61
23.	Unskilled labour	592	2.82	3.43	3.02
24.	All occupations	20,891	100.00	100.00	100.00
25.	Number of persons in sample		14,123	6,768	20,891

Source: National Sample Survey Number 14. Report on Some Characteristics of the Economically Active Population. GOI, 1959, Tables 8.2 and 8.2.7.3.

A5.3 Evidence for Statement III: An indication of attitude in a progressive society is the mobility of the population. What evidence there is indicates that, except for migration for religious and political reasons, there is relatively little migration in India and relatively little occupational mobility between generations.

Most of the evidence for this statement must be inferential and circumstantial. First, consider language. The following quotation is taken from India, 1957 (601), page 13. " The 1951 census enumerated a total of 845 languages or dialects including 720 Indian languages spoken by less than a lakh (100,000) persons each and 63 non-Indian languages. Some 32.4 crore (324 million) persons or 91 per cent of the population speak one or the other of the fourteen languages specified in the Constitution. About 1.2 crore persons (3.2 per cent) speak one or the other of the 23 tribal languages and nearly 1.8 crore persons (5.0 per cent) speak one or the other of the other Indian languages (or dialects) spoken by a lakh or more persons each". The complication of language is further exemplified by the fact that the money notes of India use nine different languages and nine different scripts to state the denomination of the note.

Migration under such difficult language conditions would normally imply gradual urbanization within a given language area for a progressive country. Yet Coale and Hoover say (p. 86) " A century ago only about half the people were devoted primarily to agriculture; by 1950 this proportion had risen to 70 per cent". It is difficult to show; but this rising proportion of people

devoted to agriculture probably reflects general immobility of the original farmers and their descendants plus the shift from rural handicrafts back to agriculture because of the flood of cheap manufactures under British rule. Furthermore, much of the apparent rise in urbanization can be explained by local natural increase. In most of India, farmers live clustered in villages and go out to their land. Technically when as many as 5,000 people cluster together, the village is reclassified as a town and becomes urban. This is the main reason why the National Sample Survey found over 26% of the urban actively engaged to be in agriculture (NSS, No. 14, 601, Table 82)

The best measure available of occupational immobility between generations is the Index of Inertia developed in this same National Sample Survey Report (p. 25). This Index of Inertia is "the percentage ratio of persons having the same occupation as the household occupation to the total number of employed persons, for any particular household occupation group, leaving out the principal earner of the household whose occupation determined the household occupation." The higher the percentage, the greater the inertia. The over-all rural index, 70, was higher than the urban 57, as might be expected. Rural cultivators had an index of 74, urban cultivators had an index of 53. Agricultural labour had rural and urban indexes of 81 and 74. The most mobile group was transport and communications with rural and urban indexes of 25 and 32. The two main groups showing the greatest rural urban difference were farmers and administrative and professional service. Among farmers' households the rural and urban indexes were 50 and 9 respectively;

among administrative and professional services households, they were 37 and 67 respectively.

One other fact is pertinent to occupational mobility among generations. The strong caste system of India had an occupational base. Although there is evidence that this occupational determination of career because of caste is breaking down, particularly in urban areas and with industrialization, much still remains. A tailor, for example, usually starts training his sons in tailoring at a very early age.

With such traditions, one does not tend to find the jack of all-trades traditional in American days of development, who could concentrate at any given time on what appeared to be most profitable. Nor is the tradition of purdah, now only partially subsiding, conducive to mobility among the female members of the labor force.

Thus wide-spread illiteracy combined with local languages and caste groups, which themselves imply specialization in occupation, make most Indians, as of 1951, unreceptive to organizational changes that would increase markedly their per capita output, given the land and capital available.

Coale and Hoover (Op cit., p. 234) give a very appropriate discussion of attitudes in general in the following language: "It is sometimes argued that this (population) pressure could have a stimulating effect; i.e., that if burdened with a larger number of dependents, the employed Indian might work harder, or the unemployed Indian might look more industriously and successfully for something to do. To rely on this argument, however, is tantamount to saying that India's development is being retarded by lack

of sufficient privation (Emphasis in original). All the evidence is to the contrary. Particular in the rural sector, where development is furthest behind and income levels lowest, the most recalcitrant obstacle to development is precisely the apathy and hopelessness that have resulted from centuries of repression and stagnation. Privation is clearly present to excess already. The key to added effort is recognition of the possibility of substantial and lasting improvement. Both apathy and poverty contribute, of course, to limiting the effort of the peasant and other low income producers. It is not a simple matter to devise worthwhile ways of putting in extra effort in a crowded rural economy where virtually the only assets a producer has are his bare hands, his fields and perhaps a bullock or two. Capital, improved methods, and hope are all needed to improve output in that situation, and the arrival of additional children furnishes none of these."

APPENDIX 6

Prerequisites for a Rising Secular Trend of Real Per Capita Income

A6.0 Introduction. Specific data to support Paragraph 6 of the main report are generally not available. Admittedly, much of the approach must be an appeal to intuition; because controlled experiments are lacking. The procedure here, therefore, will be primarily to recall the bases for such intuition. It is believed that every one of the statements made in Paragraph 6 represents a fundamental American belief.

A6.1 The first condition stated was: (a) The output-labor ratio must show a constantly rising trend. The major requirements for such success from available historical evidence are a stable government and the relative increase in the use of capital per worker, where capital is derived from savings.

Per capita income is, by definition, national income for a country for a period, usually taken as one year, divided by the average number of people in that country during the year. To simplify the discussion, it will be assumed here that there is no change in the number of people. Then per capita income as a numerical figure, depends on the national income. Now the national income may be thought of as having the following components: (a) the average number of workers contributing to the national income, (b) the average contribution per worker per hour, and (c) the average number of hours worked per year. For a given total population, all three of these components may be variable. For

example, keeping (b) and (c) constant but increasing (a) by child labor or additional female labor will increase the national income. In general, however, both (a) and (c) are primarily determined by custom and they change slowly. In the United States, the tendency for years has been to reduce child labor, to lengthen the meaning of childhood in this context by keeping a higher and higher percentage in school until about age 18 and even until age 22, and to increase the use of adult women in the labor force. Sometimes, quick spurts are made in these tendencies by the introduction of child labor laws or by the attraction of women into the labor force during wartime. Similarly, the general tendency in the United States has been to reduce the length of the working day and the number of working days in a year. But customs change more rapidly in a country like the United States than India.

No doubt it is the aim of India to decrease child labor and get the children into school. This is evident from the plans, in which the aim is to have 100% of the children age 6 to 11 in school by 1966. Peculiarly enough in the Second Five Year Plan's chapter on "Employment Aspects of the Plan," neither children nor women are mentioned. To get any reference to increasing participation of women as a method of increasing the national income, one must look under such specific parts of the plan as education and nursing. It is true that both increasing the number of workers and the time worked are emphasized in the discussions of unemployment, underemployment, and natural increase of the labor force because of increased population. Even in India, therefore, the emphasis on

increasing national income is on increasing what we would call the output per man-hour; namely, component (b).

How can this be done anywhere? Necessary conditions are taken to be a stable government and increased use of capital per worker. These are joint requirements; because capital must come from savings and savings will not be made unless the government is stable enough to protect the property rights of those who save and who own the capital. It is true that any country, such as India, could acquire capital as gifts from abroad, and it does get some in this way. It is doubtful, however, that such gifts would be made unless India demonstrated sufficient interest to do most of the savings internally. Furthermore, it is true that there can be capital formation with no voluntary individual savings. Most of Russia's present capital equipment originated in forced savings through taxes or governmental pressure to buy bonds. In such a situation, the stability of government means primarily the ability to protect and get the benefits from government property. Where private capital is more important, as in India, stability of government implies, among other things, the protection of the individual against dacoitry and other deprivation of property without due process of law plus compensation. How else can people be induced to save? The two most common customs, where governments are not stable, are to keep savings in non-productive form, such as hidden treasure or to pay warlords or their equivalent for protection, the latter of which implies that the warlords et al. supply the necessary conditions of stable government, even if it is not formalized.

Hidden treasure, though savings, does nothing to promote capital formation. Savings are a necessary but not sufficient condition to capital formation. The savings must be translated, directly or indirectly through banks, insurance companies, etc. into investment in producer's goods.

A quotation from the Second Five Year Plan, page 114, emphasizes the Indian understanding of this problem, assuming stable government; but it also shows the dilemma they faced as of 1952 because of vast unemployment and underemployment:

"The long-term objective of having a rising rate of investment, which cannot be sustained without an adequate level of savings out of current output has to be accepted. It is particularly when the capacity of decentralized production to accumulate surpluses is challenged that the conflict among different desirable objectives becomes a matter of some concern. The surplus generated per person in a comparatively labour intensive technique may be less than in a more advanced technique (emphasis supplied) but the total surplus available per unit of output for capital formation, taking into account the social and economic cost of maintaining those who would otherwise remain unemployed, may perhaps be larger in the case of labour intensive methods. In an underdeveloped economy where the distribution of doles to the unemployed is not practicable, the balance of advantage from the standpoint of equity lies decidedly in favour of labour intensive techniques. From the point of view of development, however, the difficulty in the adoption of such techniques lies in the mobilisation of the available surplus from a large number of smaller units; but this is an organizational problem and requires to be faced. At the same time continued efforts to put traditional techniques on a more efficient basis are necessary."

The Plan goes on to show how the proposed investment of Rs. 3.8 billion in the public sector and Rs. 2.4 billion in the private sector would generate an estimated 8 million new jobs.

Thus India's big problem in increasing national income was

first of all to get jobs for the millions of unemployed and underemployed, and then to get them to be productive enough to produce surpluses for new capital formation, which is admittedly the chief method for inducing secular gains in the national income.

Crude ideas of changes in capital per worker in the United States are shown by the fact that from 1900 to 1950 the gainful workers increased about 103%, producers durable equipment increased over 2200% at constant prices, or there was an increase of over 1,000% per worker. (Stat. Abs. of the U.S., 1955, Tables 237 and 393.) Does any one believe that this was not a major factor in inducing our increase in real per capita income?

A6.2 The second condition was: There must be an ever-increasing distribution of labor skills required to utilize effectively the new capital that is created. This means an increase in vocational training.

To show that India subscribes officially to this statement, one need merely point to the policy, officially adopted and widely controverted, to emphasize "basic education." The following excerpts are taken from the Second Five Year Plan, beginning on page 506:

"The importance of basic education for a country which seeks to develop rapidly is now well recognized... In 1950-51 the number of children going to basic schools accounted for less than 1 per cent of the total number of children in the elementary stage; the proportion increased to nearly 4 per cent by the end of the first plan and is expected to rise to 11 per cent by 1960-61....In order to prepare schools for conversion to the basic system, crafts and other student activities are being introduced

"in an increasing measure....The productive aspect of basic education, consistent with the requirements of education has to be recognized and encouraged as an essential part of the scheme of basic education....Frequently, when agricultural holdings are consolidated or cooperative farming units formed or when land comes into the possession of the village community from any source, it should be possible to allot an area to the village school both for its activities and for providing it with a regular source of supplementary income. Special emphasis should be placed on the quality of the articles produced....So far as possible students should participate in making the craft equipment.

"The practical value of basic education and even its financial return can be increased by linking it up with allied programmes like agriculture, village and small-industries, co-operation, development and national extension service, etc., and thereby giving a definite place to institutions imparting basic education in the scheme of development in each district and each block. This will itself help to keep basic education in step with the needs of development in other fields."

The proposal called for eight-year basic schools or five-year basic schools "feeding" a central eight-year school. There were additional proposals for practical schools at a higher level in the rural areas. On page 403 under industrial development, the following statement appears:

"Broadly speaking, the need for technically trained personnel is so important a consideration that all agreements involving foreign technical collaboration in connection with public sector projects contain special provisions regarding the training of personnel."

Thus, both by formal methods and non-formal methods, India recognizes officially the need for the development of additional labor skills.

A6.3 The third condition stated was: There must be an ever-increasing development of organizational skills on the part of the leaders to make the most effective use possible of the land, labor, and capital available at any given time.

Two current trends in India corroborate this statement. The recent Nagpur Resolution of the Congress Party called for rapid extension of rural service cooperatives and cooperative farming on a voluntary basis. The arguments appearing in the headlines and editorials of the Indian press attest to the importance of organization in agriculture, and the major controversy appears to center around the adequacy or inadequacy of the organizational skills available. Many believe that such a reorganization of agriculture will decrease rather than increase production. The point is here, however, that the problem of organizational skills is recognized.

A second illustration is the newly formed National Productivity Council, partially supported by United States funds and personnel. The main aim here is to improve industrial organization and methods, including an increasing use of statistical quality control techniques. For these purposes, one reads of seminars in business management, addressed by leading Americans in the field. There is no doubt that industry, both public and private, is aware of the need for increasing skills in organization.

1. The first part of the report is a general
introduction to the subject of the study.
2. The second part is a description of the
methodology used in the study.
3. The third part is a description of the
results of the study.
4. The fourth part is a discussion of the
results and their implications.
5. The fifth part is a conclusion and
recommendations for further research.
6. The sixth part is a list of references.
7. The seventh part is an appendix containing
additional data and figures.
8. The eighth part is a list of figures and
tables.
9. The ninth part is a list of abbreviations
and symbols.
10. The tenth part is a list of acronyms.
11. The eleventh part is a list of
initials and names.
12. The twelfth part is a list of
addresses and contact information.
13. The thirteenth part is a list of
acknowledgments.
14. The fourteenth part is a list of
contributors.
15. The fifteenth part is a list of
sponsors and donors.
16. The sixteenth part is a list of
advisors and mentors.
17. The seventeenth part is a list of
reviewers and critics.
18. The eighteenth part is a list of
editors and publishers.
19. The nineteenth part is a list of
distributors and retailers.
20. The twentieth part is a list of
customers and clients.

APPENDIX 7

Deterrents to Savings Required for Increased Capital per Worker

A7.0 Introduction This section concentrates on the difficulty of developing the necessary new capital per worker under conditions of the estimated growth of population. The point of reference will be taken chiefly as of 1961 by sex and age as given by Coale and Hoover in Appendix 3. The year 1961 is chosen as the base for these computations because presumably little if anything can be done about the population problem before 1961, the start of the Third Plan.

A7.1 The first evidence concerns the following statement:

Such unchecked increases in the population will increase rather than decrease in the short run, at least until 1986, the already high ratio of dependents to labor force. With a low per capita income at the beginning, such an increase in dependents makes savings under a voluntary system exceedingly difficult.

In Appendix 4, Section A4.10 and A4.11, it has been already demonstrated that savings were difficult because of low incomes and high dependency in 1951. If it is shown here that the dependency ratio may be expected to rise, the inference must be that for this reason, at least, it will be even more difficult to save hereafter.

It must be reiterated that the death rates assumed by Coale and Hoover for 1986 are less, on the average, than adjacent Ceylon had attained by 1952. Furthermore, as of 1959, there is no evidence of declining age specific birth rates. As of now, therefore, Coale and Hoover's high estimate seem more likely than the medium estimate.

Table A7.1.1 gives the estimated differences between the given year and 1951 in the total number of people by age groups. In Appendix 3, it was observed that Coale and Hoover's estimates and the official estimates were very similar from 1951 to 1966 in total but that the age distributions differed considerably. Because we believe that Coale and Hoover have made a better adjustment for 1951 and because we want to use their estimates for 1971 to 1986, we will use Coale and Hoover's estimates throughout. Unless otherwise stated, their estimate that assumed no change in age-specific birth rates will be presented.

Table A7.1.1 Estimated Increase in Population over 1951 by Age, India, 1961-86.

Age	Increase in Millions of Persons over 1951					
	1961	1966	1971	1976	1981	1986
0 - 4	13.9	22.6	32.2	44.5	60.0	77.2
5 - 9	10.1	18.7	27.6	37.1	49.5	64.5
10-14	6.3	12.8	21.4	30.2	39.5	51.5
15 - 44	25.3	42.3	63.8	90.9	123.6	161.6
45 - 64	9.1	16.0	23.8	32.4	41.2	50.3
65 & over	2.9	5.4	8.4	11.7	15.2	18.9
Total	67.6	117.8	177.2	246.8	329.0	424.0
0 - 14	30.3	54.1	81.2	111.8	149.0	193.2
0-14 & 65 over	33.2	59.5	89.6	123.5	164.2	212.1
15-64	34.4	58.3	87.6	123.3	164.8	211.9

Sources: Coale and Hoover: Population Growth and Economic Development in Low Income Countries: Princeton University Press, 1958, to Table 3 adjusted by multiplying by 1.014/include Jammu and Kashmir

and all of Assam.

The chief item of interest in this table is that whereas in 1951 there were estimated to be about 0.7 persons in the dependent ages of 0-14 and 65 and over for each person in the working ages of 15-64, one sees that with such an explosive population situation, about one in the dependent ages is added for every additional person in the working age group. By 1966, at the end of the Third Plan, the estimated ratio would rise to 0.78, by 1976 to 0.82 and by 1986 to 0.86. To repeat, this assumes less improvement in death rates than had occurred in Ceylon by 1952 and no change in the age-specific birth rates throughout. Such an increase in an already high dependency ratio is an overwhelming handicap to savings when one starts with the low per capita income base of India. Furthermore the child-dependency ratio; that is, the percentage under age 15 to those age 45 to 64 is estimated to rise from 0.66 in 1951 to 0.72 in 1966 to 0.75 in 1976 and finally to 0.79 in 1986. Under such a situation, the prospect of increased voluntary individual savings looks bleak.

A7.2 The second evidence concerns the following statement:

A large proportion of such savings that are made must go into such capital formation as intensified farming, housing, schools, and hospitals to give the additional population only the standards of the former smaller population. To increase real per capita income, the new capital formation should be such that there is a net increase in productivity, not merely a maintenance of the former level.

Since this will be a major discussion, it will be presented in sections.

A7.2.1 General. Coale and Hoover have presented in Parts Four and Five of their book (Population Growth and Economic Development in Low-Income Countries. Princeton University Press, 1958) a thorough analysis of the effects of different population growths on such items as national income, development expenses and welfare expenses, both gross and per capita. An econometric model was developed and tested under certain varying assumptions. Careful study of this book is recommended to anyone interested in the problem of the interrelationship between population and economic growth potentials. Two quotations will be given here to reflect their conclusions based on an extensive study of India and a less extensive one of Mexico. (1) "If a country now has low incomes, a high birth rate (say, 40 per thousand or higher) and is in the process of reorganizing its economy to a more productive form, it will achieve a higher total product during the next 20 or 30 years if it reduces fertility. This greater product is in addition to the per capita gains resulting from a division of the product among a smaller number of consumers. (Emphasis in the original). The differential advantage to be gained by reduced fertility is in the same general range whether the country is large or small, has just begun to reduce its mortality or has already made major advances in health, is relatively self-sufficient or rather heavily engaged in trade, and whether development is following a socialist or capitalist

pattern." (p.320). (2) "High fertility is a necessity for human survival when mortality risks are great. When mortality risks are reduced, high fertility becomes^a/burden--by increasing the dependency ratio, by diverting capital from uses that would raise per capita output, and in the long run by overwhelming any finite resources. If better health and longer life are valued, high fertility must be considered an extravagance. A population with high incomes and ample resources may be able to afford it for a period, perhaps for many decades. But a low-income area with high fertility that chooses the luxury of sustained births inevitably chooses to forego a much more rapid expansion of per capita incomes. Reduced fertility permits higher per capita income in the short run and in the intermediate future; in the distant future it can avert the otherwise inevitable return of poverty and high death rates." (p. 331).

It will not be the aim of this section to reproduce Coale and Hoover's model. The aim will be rather to give some insight into what may be called the present value of **costs** of additional population. We will present independent data for individual major items, disregarding except intuitively the interrelationships among these independent data. The weakness of this approach over the econometric model approach is that it does not present a total inter-related picture. The advantage is in the simplicity of approach.

A7.2.2 General Approach. The general approach may be stated as follows:

An idea of the cost at any one period of time of an increasing future population may be obtained by computing the present value at that point of time of costs incurred for that portion of the additional population that will add nothing to the national income at the future date but will make demands on it. Such a procedure is valid only under the condition that at the starting point, there is an excess of labor supply relative to the land and capital available, which excess is reflected in low per capita income and large unemployment and underemployment. Appendix 4 has established the fact that India met these conditions in 1951. In the succeeding demonstrations, analysis will be restricted to direct costs associated with an increase in children under age 15.

Pertinent assumptions for every demonstration are:

(a) Marginal costs equal average costs at about 1951. In general, this is a conservative assumption. For example, if an additional ton of foodgrains is required, the cost of that additional ton is assumed to be the same as the average cost around 1951, no matter whether one additional ton or 10 million additional tons are required. This is completely unrealistic, as far as we know at present. It is not as unrealistic when one talks of additional schooling, particularly the wage cost of personnel.

(b) Children under age 15 are potential future members of the

labor force. Nevertheless, as one sees from the plans, increases in the labor force are considered burdens to be met, not assets to the Indian economy. Therefore, it is not considered necessary to subtract from the costs of maintenance under age 15 the contributions to be made by these extra children during their working years.

(c) All indirect costs will be disregarded. By indirect costs are meant the difference in the activity of the persons of labor force ages with and without the extra children. For example, with fewer children, participation of women in the labor force would probably be greater than if there were more children. A smaller proportion of the labor force should be diverted from the production of goods to the production of services such as public health and education if there are fewer rather than more children. The production of goods itself would be different with smaller demand for articles required by children. This assumption is conservative, in the sense that true costs will be understated.

(d) There is no contribution to the national income from children under age 15. The National Sample Survey reported 9.45 percent of those under age 15 in the labor force in the 7th round (NSS, No. 14, Table 7.7.7.3, p. 150). and they comprised 8.78 percent of the labor force. This assumption, granted present conditions, overstates the costs that will be computed; but it is the aim of the plans to get 100 percent of all children age 6 to 11 in school and "one of the Directive Principles in the Constitution is that within a period of 10 years from 1950-51, free and

compulsory primary education for all children until the ages of 14 should be provided." (Second Five Year Plan, GOI, p.72). This assumption therefore is reasonably realistic in terms of India's goals even assuming some production in Basic Education schools and part-time work outside. Taken with assumptions (a) to (c) above, the net effect is undoubtedly an understatement of costs.

(e) To obtain present values, a discount rate of 5 percent per year will always be assumed.

(f) To get a complete picture of the excess children under age 15, it is necessary to estimate how many such children are needed to maintain a stable population of 430 million people assumed for 1961. Section A7.2.3 will be devoted to this task. It should be emphasized that some of the excess is attributable to children born before 1961, and that part is therefore an unavoidable burden.

A7.2.3 Estimate of Number of Children Needed to maintain a Stable Population of 430 million people, 1961 to 1986.

A7.2.3.1 The critical values needed for this demonstration are the assumed survival ratios. To be consistent with other tables, we start with the expectation of life assumed by Coale and Hoover in their Table 6, page 36 for males and females. Now the expectation of life divided into 1,000 gives the death rate of a stable population with the given expectancy. If this in turn is multiplied by the stable population required, it gives the annual deaths for that stable population. But to make it stable, births and deaths must, in general, balance. Therefore one can determine for a stable population the number of births required annually.

Finally, from the life table associated with a given expectation, one can estimate the proportion and number of children under age 15. These values will now be presented at the quinquennial periods. It should be noted that some children born before 1961 who survive to 1961 and after are included as excess.

A7.2.4 Excess of children Under Age 15 Over Those Needed for Stable Population of 430 millions.

Table A7.2.4.1 gives the estimated required population under age 15 needed for stability at 430 millions by age and sex. Sex values are estimated from the ratios obtained in Coale and Hoover's Table 3. Table A7.2.4.2 gives the estimated excess population over the required. Because it is a critical item, the equivalent adult consumers for this excess is also shown by giving weights of 0.5 to children under age 10, 0.9 to women age 10 and over, and 1.0 to males age 10 and over in accordance with the procedure of the Indian Council of Agriculture Research as cited in Coale and Hoover, page 88. Furthermore, because of school ages, the excess population for children aged 6 to 11 and 12 to 14 is estimated using arithmetical interpolation in the belief that more elaborate methods are unjustified.

Table A7.2.4.1 Estimate of Population Under Age 15 Required to Stabilize the Indian Population at 430 million, 1961 to 1986.

Table A7.2.4.1 Estimate of Population Under Age 15 Required to Stabilize the Indian Population at 430 million, 1961 to 1986
Year = x

<u>Line</u>	<u>Item</u>	<u>1956</u>	<u>1961</u>	<u>1966</u>	<u>1971</u>	<u>1976</u>	<u>1981</u>	<u>1986</u>
1.	Male expectation of life at birth in years	37.1	42.6	45.5	48.5	50.0	51.5	51.5
2.	Female expectation of life at birth in years	38.5	44.2	47.3	50.3	51.7	53.1	53.1
3.	Combined expectation of life at birth in years	37.8	43.4	46.4	49.4	50.8	52.3	52.3
4.	Life Table death rate (1,000 ÷ 1.3)	26.5	23.0	21.6	20.2	19.7	19.1	19.1
5.	Millions of births required to produce stable population of 430 millions in millions (1.4x0.43)	11.4	9.9	9.3	8.7	8.5	8.2	8.2
6.	Estimated ratio of number age 0-4 to births	3.68	3.88	4.01	4.09	4.14	4.21	4.21
7.	Required population, age 0-4, in millions (1.5 x 1.6)	42.0	38.4	37.3	35.6	35.2	34.5	34.5
8.	Survival ratio, age 0-4 to 5-9, x-5 to x	0.870	0.898	0.915	0.925	0.933	0.942	0.942
9.	Required population, age 5-9 (1.7 for x-5 x 1.8) in millions	41.6	37.7	35.1	34.5	33.2	33.2	33.2
10.	Survival ratio, age 5-9 to 10-14, x-5 to x		0.973	0.974	0.976	0.979	0.979	0.979
11.	Required population, age 10-14 (1.9 for x-5 x 1.10) in millions		40.5	36.7	34.3	33.8	32.5	32.5
12.	Required population, age 0-9, in mills. (1.7 + 1.9)		76.1	72.4	70.1	68.4	67.7	67.7
13.	Required population, age 0-14, in millions (1.11 + 1.12)		116.6	109.1	104.4	102.2	100.2	100.2

Sources and explanation appear in text.

Table A7.2.4.2. Estimated Excess Population Under Age 15, by Age and Sex, and Corresponding Equivalent Adult Consumer Units, India, 1961 to 1986.

<u>Line</u>	<u>Item</u>	Y E A R (In millions)					
		<u>1961</u>	<u>1966</u>	<u>1971</u>	<u>1976</u>	<u>1981</u>	<u>1986</u>
1.	Estimated actual population under age 15	170.8	194.6	221.7	252.3	289.5	333.7
2.	Estimated required population under age 15 for stability	116.6	109.1	104.4	102.2	100.2	100.2
3.	Estimated excess population under age 15	54.2	85.5	117.3	150.1	189.3	233.5
4.	Males, age 0 - 4	15.6	20.5	26.3	32.8	41.0	49.7
5.	Females, age 0 - 4	15.2	20.2	25.7	31.9	39.9	48.3
6.	Males, age 5 - 9	8.6	14.2	19.0	24.4	30.7	38.4
7.	Females, age 5 - 9	8.5	14.0	18.7	24.1	30.2	37.6
8.	Males, age 10 - 14	3.2	8.3	13.9	18.5	23.9	30.0
9.	Females, age 10 - 14	3.1	8.3	13.7	18.4	23.6	29.5
10.	Total, age 0 - 5	34.2	46.3	59.5	74.4	93.1	113.2
11.	Total, age 6 - 11	16.2	29.2	41.2	53.6	67.7	84.6
12.	Total, age 12 - 14	3.8	10.0	16.6	22.1	28.5	35.7
13.	Estimated excess equivalent adult consumers	29.9	50.2	71.1	91.9	116.0	143.6

Sources and explanation given in text.

It may be of interest to give the stable population that Coale and Hoover's 1981 life table implies for a total of 430 million persons. This appears in Table A7.2.4.3 by age and sex with comparisons with the predicted population for 1961. In viewing the differences between the predicted 1961 and stable populations, it must be remembered that some of the excess is required at the early ages because the death rates will still be higher than those assumed for 1981. It is of particular interest to note that the stabilized population has a child dependency percentage of 37.5 whereas the expected for 1961 is 69.6 percent. The respective total dependency percentages are 52.7 and 74.9.

Table 17.2.4.3. Predicted Population, 1961, and 1981 Stabilized Population at 1961 Total, India, by Age and Sex in Millions

	Predicted Population 1961			Stabilized Population 1981 Life Table			1961 Minus Stabilized Population			% Difference, Predicted to Stabilized		
	To- tal	Male	Fe- male	To- tal	Male	Fe- male	To- tal	Male	Fe- male	To- tal	Male	Fe- male
0-4	69.5	35.1	34.4	36.8	18.7	18.1	32.7	16.4	16.3	89	88	90
5-9	54.7	27.4	27.3	34.8	17.6	17.2	19.9	9.8	10.1	57	56	59
10-14	46.9	23.5	23.4	34.1	17.2	16.9	12.8	6.3	6.5	38	37	38
15-19	42.1	21.1	21.0	33.5	16.9	16.6	8.6	4.2	4.4	26	25	27
20-24	37.7	19.0	18.7	32.6	16.5	16.1	5.1	2.5	2.6	16	15	16
25-29	33.3	16.9	16.4	31.6	16.0	15.6	1.7	0.9	0.8	5	6	5
30-34	29.4	15.0	14.4	30.5	15.5	15.0	-1.1	-0.5	-0.6	-4	-4	-4
35-39	25.7	13.1	12.6	29.4	15.0	14.4	-3.7	-1.9	-1.8	-13	-13	-13
40-44	22.1	11.3	10.8	28.3	14.4	13.9	-6.2	-3.1	-3.1	-22	-22	-22
45-49	18.7	9.5	9.2	26.9	13.7	13.2	-8.2	-4.2	-4.0	-30	-31	-30
50-54	15.4	7.7	7.7	25.2	12.8	12.4	-9.8	-5.1	-4.7	-39	-40	-38
55-59	12.3	6.1	6.2	23.2	11.7	11.5	-10.9	-5.6	-5.3	-47	-48	-46
60-64	9.2	4.5	4.7	20.4	10.2	10.2	-11.2	-5.7	-5.5	-55	-56	-54
65-69	6.4	3.1	3.3	17.0	8.4	8.6	-10.6	-5.3	-5.3	-62	-63	-62
70-74	4.0	1.9	2.1	13.1	6.4	6.7	-9.1	-4.5	-4.6	-69	-70	-69
75-79	1.9	0.9	1.0	8.5	4.1	4.4	-6.6	-3.2	-3.4	-78	-78	-77
80-84	0.6	0.3	0.3	3.6	1.7	1.9	-3.0	-1.4	-1.6	-83	-82	-84
85 and over	0.1	0.04	0.06	0.5	0.2	0.3	-0.4	-0.16	-0.24	-80	-80	-60
Total	430.0	216.4	213.6	430.0	217.0	213.0	0.0	-0.6	+0.6	0	0	0
0-14	171.1	86.0	85.1	105.7	53.5	52.2	65.4	32.5	32.9	62	61	63
15-64	245.9	124.2	121.7	281.6	142.7	138.9	-35.7	-18.5	-17.2	-13	-13	-12
65 and over	13.0	6.2	6.8	42.7	20.8	21.9	-29.7	-14.6	-15.1	-70	-70	-69

Table 1. Summary of the results of the analysis of variance for the effect of the treatment on the response of the different groups of subjects.											
Source of variation											
Between groups											
Within groups											
Total											
Error											
Grand total											
Mean square											
F value											
Probability											
Significance											
Degrees of freedom											
Sum of squares											
Standard error											
Coefficient of variation											
Correlation coefficient											
Regression coefficient											
Intercept											
Slope											
Variance ratio											
Mean square error											
Standard error of the mean											
Coefficient of determination											
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A7.2.5 Estimated Births to be Prevented to Provide Stable Population of 430 millions.

A critical value for this presentation is the number of births that must be prevented if the population is to be stabilized at 430 millions. Table A7.2.5 emphasizes the magnitude of the problem, namely that there is anticipated an excess of 8.1 million births in 1961 rising to an excess of 10.3 millions in 1966 and 23.3 millions in 1986. Put another way, 45 percent of expected births must be prevented in 1961 for such ultimate stability, 53 percent in 1966, and 74 percent in 1986. The cumulative effect of early prevention is evident during this period; because girls born in 1961 will be potential producers of children not long after 1976.

Table A7.2.5 Estimated Number of Births to be prevented to Give an Eventual Stable Population of 430 Millions, India, 1961 to 1986.

Line	Item	Year					
		1961	1966	1971	1976	1981	1986
1.	Estimated population in Millions (C & H, high)	429.9	479.6	539.4	609.4	691.5	785.9
2.	Birth rate per 1,000 population (C & H, high)	41.9	40.9	40.2	40.0	40.0	40.0
3.	Expected births in Millions (1.1 times 1.2)	18.0	19.6	21.7	24.4	27.7	31.4
4.	Required live births in Millions (Table A7.2.4.1)	9.9	9.3	8.7	8.5	8.2	8.2

5. Number of births to be prevented for stability in Millions.	8.1	10.3	13.0	15.9	19.5	23.2
6. Percentage of expected births to be prevented.	45	53	60	65	70	74

A7.2.6 Food. Table A7.2.6 gives an estimate of the presented value in 1961 of food costs for the excess children expected under age 15 over those required for a stable population. The table is reasonably self-explanatory but the following explanations may be helpful:

Line 1. Taken from Line 13, Table A7.2.4.2.

Line 2. The 0.22 tons of foodgrains per adult consumer was estimated as follows: In Table 57 of Report No. 1 of the National Sample Survey, the Indian rural consumption of foodgrains is given as 202.74 seers per person in 1949-50. Coale and Hoover estimate 348 million adult consumer equivalents in 1961 for a population of 427 million, excluding Jammu and Kashmir and part of Assam. This averages 0.821 adult equivalent consumers per person. Therefore, a consumption of 202.74 seers per person may be translated into a consumption of 247 seers per adult consumer. A seer is about two pounds. Thus, the consumption may be estimated at 0.247 tons per equivalent adult consumer. Rural consumption is probably somewhat higher than urban. Therefore a value of 0.22 tons was used.

Line 3. The estimated retail cost of foodgrains was determined from the same NSS report by observing that the value of

foodgrain consumption per person was Rs.85.03 (Table 13). For 202.74 seers, this gives a price in 1949-50 of Rs.0.4.94 per seer or Rs.419.4 per ton in 1949-50, which was rounded to Rs.420 per ton as the average value of foodgrains. For these purposes, this value is considered to be conservative.

Line 4. The values are $(1.05)^{-n}$ where n is the number of years from 1961 to the given date.

Line 5. Line 3 times Line 4.

Line 6. The 58% value is taken from NSS Report No. 1 as cited in Table A4.2. It is the percentage of Rs.442.61 to Rs.758.27.

Line 7. The value of 75 million tons was cited by Professor P. C. Mahalanobis as normal "gross" production requirements at the beginning of the third plan, 1961. The citation appears in a paper "Target of Foodgrains in 1965-66" presented before the Planning Commission. The paper is dated 26 March, 1959.

Line 8. The value of Rs.125 billion, in 1957-58 prices, is given in "Certain Dimensional Hypotheses Concerning The Third Five Year Plan" by Pitanber Pant, Chief of Perspective Planning Division, Planning Commission, 19 November 1958.

A7.2.6.1 Conclusions from Table A7.2.6 are critical to this whole presentation: (1) The excess equivalent adult consumer units amount to nearly 30 millions in 1961 and are expected to rise to nearly 145 millions in 1986. These excesses refer to children under 15 only, and the excess is that over the number required to stabilize the population at 430 million people.

Table A7.2.6. Estimated Present Value in 1961 of Food Costs for Excess Population Under Age 15; 1961 to 1966.

<u>Line</u>	<u>Item</u>	Y E A R					
		<u>1961</u>	<u>1966</u>	<u>1971</u>	<u>1976</u>	<u>1981</u>	<u>1986</u>
1.	Excess equivalent adult consumers in millions	29.9	50.2	71.1	91.9	116.0	143.6
2.	Millions of tons of foodgrains at 0.22 tons per equivalent adult consumer	6.6	11.0	15.6	20.2	25.5	31.6
3.	Cost of additional foodgrains in Rs. billion at Rs. 420 per ton	2.8	4.6	6.6	8.5	10.7	13.3
4.	Present value, 1961, of R. 1.0 at 5% per year	1.000	0.784	0.614	0.481	0.377	0.302
5.	Value, 1961, of additional foodgrains in Rs. billion	2.8	3.6	4.1	4.1	4.0	4.0
6.	Value, 1961, of additional food costs if food-grains are 50% of food expenditures, in Rs. billions	4.8	6.2	7.1	7.1	6.9	6.9
7.	Percentage of additional foodgrains to normal 1961 crop of 75 million tons	8.8	14.7	20.8	24.9	34.0	42.1
8.	Percentage of present value, 1961, additional food costs to expected 1961 national income of Rs. 125 billion	3.8	5.0	5.7	5.7	5.5	5.5

Sources and explanation appear in text.

These excess equivalent adult consumers rise from about 9 percent of the total equivalent adult consumers in 1961 to nearly 23 percent of the total in 1986. By the end of the third plan in 1966, they will comprise over one-seventh of the total. This will be a terrible burden, which will intensify the difficulty of saving and capital formation.

(2) The additional tons of foodgrains for these excess adult consumer units rises from 6.6 millions in 1961 to 31.6 millions in 1986. If the difference is spread equally over the years, it means one million additional tons of foodgrains required per year. If the base is taken as 75 millions "gross" in 1961 and if 12.5% of the total is required for seeds, wastage, etc., as is assumed in the Planning Commission, there would be a conservative requirement of 114.3 million tons production by 1986 or an increase of 1.7% per year for 25 years to feed people who are all classified as a burden rather than a strength to the economy.

(3) The cost of this additional foodgrain for one year, assuming that marginal cost equals average previous cost, which is probably a gross understatement, rises from Rs. 2.8 billion in 1961 to Rs. 13.3 billion in 1986. If foodgrains are

58% of total food costs, this means an increase in consumer outlays for food from Rs.4.8 billion in 1961 to Rs.22.9 billion in 1986 at current costs, and it means that the present value of such a future expense for any one year, beginning about 1971, is about Rs.7.0 billion in 1961, or 5.7 percent of the expected 1961 national income. In 1961, domestic savings are supposed to be 8.4 percent of net domestic product, which differs insignificantly from national income. ("Certain Dimensional Hypotheses Concerning the Third Five Year Plan" by Pitamber Pant, 1958). For a national income of Rs.125 billions, this means domestic savings of Rs.10.5 billions in 1961. Notice that if half of the present value of future annual food costs for excess children were applied to birth prevention and half to increased savings, there would be available in 1961 Rs.3.5 billions for each, which implies an increase of one-third in the savings potential.

A major difficulty, of course, is that it is rare that one believes in the reality of present value of future expenses as present costs. This does not make them less real, nevertheless. The argument may be advanced that the population projections assumed here are based on unknowns. Of course that is true; all planning for the human future is based on unknowns. It would be an imprudent person or nation, however, that did not attempt to take into account in planning at least crude reasonable anticipations. The impressive feature of Table A7.2.6 is that, using a 5 percent

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interest rate, the present value in 1961 of the additional food-costs is a maximum for 1971, and the projected value for 1966 is 87 percent of that maximum. One rightly has greater confidence in shorter than in longer projections of this type.

Notice that if half the maximum present value were devoted to birth prevention, there would be available Rs.3.5 billions to prevent 8.1 million births (Table A7.2.5) or Rs.432 available per birth prevented from food savings alone.

A7.2.7 Schooling.

According to the "Certain Dimensional Hypotheses Concerning the Third Five Year Plan" (Pitamber Pant, November, 1958) compulsory primary education for children age 6-11 is to become universal by the end of the third plan in 1966. There is to be an increase of 25 percent from 1961 to 1966 of those age 11-14 in school, presumably over the second plan target of 22.5% (Second Five Year Plan, GOI, 1956, p. 501). In addition, there is supposed to be improvement and expansion in education for those aged 15 and over, which will be disregarded here; because our whole emphasis is on costs of excess children under age 15.

Table A7.2.7 summarizes the educational costs of the excess children under age 15 on the assumption that the plan targets will be fulfilled. Since the constitution contains a directive principle that free and compulsory education should be provided for all children until they complete the age of 14 years (Second Five Year Plan, p.502) by 1961, it will be assumed that such a program is actually completed by 1986 by interpolating arithmetically in the percentage of such students age 11-14 attending school from 1966-1986.

Table A7.2.7 Schooling Attendance and Costs for Excess Children Under Age 15, India, 1961 to 1986.

<u>Line</u>	<u>Item</u>	Y E A R					
		<u>1961</u>	<u>1966</u>	<u>1971</u>	<u>1976</u>	<u>1981</u>	<u>1986</u>
1.	Expected millions of children, age 6 - 11	62.6	72.0	82.5	93.7	107.3	124.2
2.	Required millions of children, age 6 - 11	46.4	42.8	41.3	40.1	39.6	39.6
3.	Excess millions of children, age 6-11	16.2	29.2	41.2	53.6	67.7	84.6
4.	Expected millions of children, age 6 - 11, in school	39.3	72.0	82.5	93.7	107.3	124.2
5.	Required millions of children, age 6 - 11, in school	39.3	42.8	41.3	40.1	39.6	39.6
6.	Excess millions of children, age 6 - 11, in school	0	29.2	41.2	53.6	67.7	84.6
7.	Expected millions of children, age 12 - 14	28.1	32.0	37.2	42.4	48.0	55.2
8.	Required millions of children, age 12 - 14	24.3	22.0	20.6	20.3	19.5	19.5
9.	Excess millions of children, age 12 - 14	3.8	10.0	16.6	22.1	28.5	35.7
10.	Expected percentage of children, age 12 - 14, in school	22.5	24.7	43.5	62.4	81.2	100.0
11.	Expected millions of children, age 12 - 14 in school	6.3	7.9	16.2	26.5	39.0	55.2
12.	Required millions of children, age 12 - 14, in school	5.5	6.9	9.0	12.7	15.8	19.5
13.	Excess millions of children, age 12 - 14, in school	0.8	1.0	7.2	13.8	23.2	35.7
14.	Expected millions of children, age 6 - 14	90.7	104.0	119.7	136.1	155.3	179.4
15.	Expected millions of children, age 6 - 14, in school	45.6	79.9	98.7	120.2	146.3	179.4
16.	Required millions of children, age 6 - 14, in school	44.8	49.7	50.3	52.8	55.4	59.1
17.	Excess millions of children, age 6 - 14, in school	0.8	30.2	48.4	67.4	90.9	120.3
18.	Billions of Rs. direct cost, excess students @ Rs. 40	0.0	1.2	1.9	2.7	3.6	4.8
19.	Present value, 1961, of direct cost for excess students in Rs. billions	0.0	0.9	1.2	1.3	1.4	1.4

Sources and explanation appear in text.

A7.2.7.1 The explanations for Table A7.2.7 follow:

Line 1. The sum of lines 2 and 3.

Lines 2 and 8. From lines 9 and 11, Table A7.2.4.1 with arithmetic interpolation.

Line 3 and 9. From lines 11 and 12, Table A7.2.4.2.

Line 4. From The Second Five Year Plan, p. 501, 62.7% of the children age 6-11 are supposed to be in school in 1961. This value is multiplied by 62.6 millions in line 1. All other values from line 1, as 100% are supposed to be in school.

Line 5. For 1961, value taken from line 6; for all others, from line 2.

Line 6. For 1961, zero; because number in school is less than required number. For all other years, from line 3.

Line 7. From line 11, Table A7.2.4.1; 60% of those values.

Line 10. The Second Five Year Plan, p.501, gives 22.5% of children age 11-14 (taken here as 12-14) to be in school in 1961. The 1966 value is found by adding 25% to the 1961 number on line 11 (6.3) and taking the percentage of line 7. The 25% value is from Pitamber Pant's "Certain Dimensional Hypotheses Concerning the Third Five Year Plan." All other values are interpolated arithmetically between the 1966 value and 100% for 1986, which 100% the constitution called for by 1961.

Line 11. Line 7 times line 10.

Line 12. Line 8 times line 10. This assumes the same pace for the required as for the actual. Notice that if the pace chosen were taken from line 11, there could be 100% age 12-14 in school sometime between 1971 and 1976 instead of in 1986.

Line 13. Line 11 minus line 12.

Line 14. Line 1 plus line 7.

Line 15. Line 4 plus line 11.

Line 16. Line 5 plus line 12.

Line 17. Line 15 minus line 16.

Line 18. In the 1952-53 Statistical Abstract, India, page 100 and 132 the direct cost per student in all schools is computed to be Rs.40.6. For those under "Intermediate" it is computed at Rs.30.6 per student. Coale and Hoover cite (p.249) cost estimates as of 1950 from a Report of the Committee on Ways and Means of Financing Educational Development as: Current expenditure, net of depreciation and interest) as Rs.31.5 per student per year; cost of teacher training at Rs.30 per pupil;

and expenditure on construction as Rs.32.5 per pupil. These last two may mean "per additional pupil"; but there must also be teacher replacement and building repairs, etc. Therefore an in-between estimate of Rs.40 per student per year direct expenses has been assumed.

Line 19. Line 4 of Table A7.2.6 times line 18.

A7.2.7.2 Conclusions on Schooling.

(1) Excess students, age 6-14, over those required for a stable population of 430 millions are estimated to amount to 0.8 million in 1961, 30.2 millions in 1966 and 120.3 millions in 1986. The direct cost at Rs.40 per student per year rises from a negligible amount in 1961 to Rs.4.8 billion in 1986, if the pace of additional schooling for the actual students and the required students were to be the same.

(2) Although we are disregarding costs for older students, it should be noted that by 1966 there would be an excess of one million students age 12-14 in school and by 1986, this excess would amount to 35.7 millions. If anything like the present (1959) proportion of those prepared for "Intermediates" and B.A. and B.Sc. were to be continued the additional cost of higher education would be stupendous.

(3) The present value of the annual direct costs of education of excess students as of 1961, rises from a negligible amount in 1961 to a maximum of Rs.1.4 billion in 1981 and 1986. This, it should be noted, implies relatively little improvement in quality of education over 1951-52. A direct cost of Rs.40

per student per year equals \$8.40 at Rs.4.76 per dollar. In 1954, the lowest current expenditure per fulltime day school, elementary and secondary, in the United States was \$122.60 for Mississippi and the average for Continental United States was \$264.76 (Statistical Abstract of the U.S., 1957, Table 143).

These values are respectively nearly 15 times and nearly 32 times those assumed for India. It is highly unlikely that such a difference is justifiable assuming equal quality of education. If teachers salaries are taken at about 60% of total expenditures and if there are 30 students per teacher this implies a teacher's salary slightly over \$150 per year or about 4% of the United States average in 1954 (Ibid, Table 142). This is not a favorable comparison with the belief expressed by Indians who have travelled in the United States that in services, such as tipping and hair-cuts, a rupee (21 cents) in India equals \$1.00 in the U.S.A.

A7.2.8 Housing the Excess Population.

A7.2.8.1 The general approach to housing must be different from those presented previously. The idea is that one new house must be built for every newly married woman from the excess population already established, including any newly married daughter to such a woman. Because housing costs are vastly different in rural and urban areas, estimates will be made separately for urban and rural women on the assumptions that total urban population follows the currently believed increase of 4 percent per year and that marriage and birth rates by age are the same in rural and urban communities. Obviously these are crude assumptions;

but they will **satisfy** the general condition of giving some idea of the present value in 1961 of costs of such future housing for the excess population over that required to maintain stability at 430 millions.

A7.2.8.2 Table A7.2.8.2 summarizes the results required for the study; but the methodology follows in detail instead of adding worksheet tables.

Line 1. From Table A7.2.4.2 were obtained the excess females aged 0-4, 5-9, and 10-14 for the years 1961 to 1986. Some of these would enter the child bearing period, supposedly starting at age 15, before 1986. From Coale and Hoover's Table 3, females, survivorship ratios were obtained for each specific group. For example, those 0-4 in 1961 would 15-19 in 1976; 20-24 in 1981; and 25-29 in 1986. The appropriate survivor ratios were computed and applied, item by item, to ~~the~~ pertinent values in Table A7.2.4.2. These yielded a table of those 15-19 in 1966, 15-24 in 1971, 15-29 in 1976, 15-34 in 1981, and 15-39 in 1986. The values were summed at each point to obtain the figures in line 1.

Line 2. From a combination of data from the National Sample Survey's "Couple Fertility", Table 5.5 and the percentage married by broad age groups in Table 14 of the Statistical Abstract of 1953-54, the following percentage of married women were assumed: 15-19: 65.6; 20-24: 96.2; 25-29: 92.6; 30-34: 85.2; and 35-39: 84.0. The decline in the later years **is** attributable to increasing widowhood and the custom of widows not to remarry.

Table 17.28.2. Costs of Housing Excess Population, 1966 to 1986.

<u>Line</u>	<u>Item</u>	Y E A R				
		<u>1966</u>	<u>1971</u>	<u>1976</u>	<u>1981</u>	<u>1986</u>
1.	Millions of first generation excess females, age 15 - 39	3.0	11.1	24.2	41.6	62.4
2.	Millions of first generation newly married excess females	2.0	6.2	11.1	15.6	20.2
3.	Millions of second generation excess females, age 15 - 24				1.1	3.9
4.	Millions of second generation newly married excess females				0.7	1.9
5.	Millions of new excess households established	2.0	6.2	11.1	16.3	22.1
6.	Millions of new excess rural households establ.	1.5	4.7	8.1	11.7	15.4
7.	Millions of new excess urban households establ.	0.5	1.5	3.0	4.6	6.7
8.	Current cost of rural excess houses in Rs. billion at Rs. 450	0.7	2.1	3.6	5.3	6.9
9.	Current cost of urban excess houses in Rs. billion at Rs. 5,000	2.5	7.5	15.0	23.0	33.5
10.	Current cost of total new excess houses in Rs. billions	3.2	9.6	18.6	28.3	40.4
12.	Plan centered annual cost of excess houses in Rs. billion plan period ending	0.6	1.9	3.7	5.7	8.1
13.	Present value, 1961, of annual cost of excess houses in Rs. billion	0.5	1.3	2.0	2.4	2.7
14.	Present value, 1961 of total cost of excess houses in Rs. billions, per plan period	2.8	6.7	10.1	12.1	13.5

Sources and explanation given in text.

These marriage percentages were applied item by item, to the excess females obtained for line 1. The values were summed without double counting. For example, it was estimated that of 3.1 million excess females, age 10-14 in 1961, 3.0 million would survive to 1966, when they would be age 15-19. Of these 2.0 million would be married in 1966. Of the 2.9 million who survived until 1971, 2.8 million would be married. For 1971, only the additional 0.8 million were included in line 2.

Lines 3 and 4. The 3.0 million women aged 15-19 in 1966 would presumably produce 0.6 million children in 1966. By 1981, the female second generation excess children would be in the childbearing age, if they survived. To obtain the estimated number . . . born, Coale and Hoover's crude birth rate for 1966 of 40.9 per 1,000 was applied to their total population value of 473 millions. The ratio of the surviving females, aged 15-19 in 1981 was applied to ^{births} 0.6 million excess/in 1961 to estimate the second-generation females aged 15-19 in 1981 who survived. Of these, 65.6 percent were assumed to be married. These are the second generation excess married women. Their survivors and the married females age 20-24 were then computed for 1986 and the additionally married ones only were counted. Then the procedure was started again for those women aged 15-19 in 1971 who would have surviving female children aged 15-19 in 1986. Line 3 is made up of one value for 1981 and the sum of two values for 1986. Line 4 is the corresponding number newly married.

Line 5. Line 2 plus line 4.

Lines 6 and 7. From Pitamber Pant's "Certain Dimensional

Hypotheses concerning the Third Five Year Plan", an estimate of 340 million rural population is made for 1961. This leaves 89.9 million urban. The Planning Commission is currently assuming an increase of 4 percent per year in the urban population. The urban population was therefore projected at the 4 percent rate until 1986. The rural population was taken as the difference between the urban population and the total given on line 1, Table A7.2.4.2. The resulting percentage rural and urban were finally applied to line 5 to obtain lines 6 and 7.

Lines 8 and 9. In Pitamber Pant's paper (ibid) the estimated cost of rural housing per unit is given as Rs.400-500. For urban, the value is given as Rs.5,000.

Line 10. Line 8 plus line 9.

Line 11. The arithmetic means of the end points of plan periods from line 10.

Line 12. One-fifth of line 11.

Line 13. The items of line 12 times, respectively $(1.05)^{-7.5}$, $(1.05)^{-12.5}$, etc.

Line 14. ~~Line~~ 13 times 5.

A.7.2.8.3. Conclusions.

(1) By 1986, it is estimated that 57.8 million new households will be formed from marriages of excess children produced in the period and from the marriages of the daughters of these excess children.

(2) The estimated cost of the 57.8 million excess houses required for these households is Rs.100.1 billion with a present

value in 1961 of Rs.45.2 billion or 36% of the estimated 1961 Indian national income.

(3) The present value in 1961 of future annual costs per plan period increases as one goes from the plan period 1961-66 to 1981-86. Some of this increase is attributable to the fact that the second generation of excess married females has started to appear by the plan period 1976-1981.

A.7.2.9. Summary Statement of Costs of Excess Children While They are Under Age 15, Excluding Housing, India, 1961-86. (See Table A7.2.9).

Table A7.2.9. Computation of Present Value, 1961, of Costs of Excess Children Under Age 15, Excluding Housing, 1961-1986

n=	A7.2:5	C+H #3	Act. Births in Mills.	C+H#3 Req. B.R. for Stab- ility = 1/e ⁰	Req. Births in Mills. 430.0 x Prec. col.	Excess Births in Mills.	Current P.V. of costs to age 15 @ Rs. in Bills	(1.05) ⁻ⁿ	P.V. 1961 of Each Years Costs Rs. Bills	Sum. Total P.V. 1961 Rs. Bills
Year	Actual Pop. Mills.	Act. B.R. per 1,000	Act. Births in Mills.							
1961	429.9*	41.9*	18.0	23.0*	9.9	8.1	11.1	1.0000	11.1	11.1
1962	439.8	41.7	18.4	22.72	9.8	8.6	11.8	0.9524	11.2	22.3
1963	449.8	41.5	18.7	22.44	9.6	9.1	12.4	0.9070	11.2	33.5
1964	459.7	41.3	19.0	22.16	9.5	9.5	13.0	0.8638	11.2	44.7
1965	469.7	41.1	19.3	21.88	9.4	9.9	13.5	0.8227	11.1	55.8
1966	479.6*	40.9*	19.6	21.6*	9.3	10.3	14.1	0.7835	11.0	66.8
1967	491.6	40.76	20.0	21.32	9.2	10.8	14.8	0.7462	11.0	77.8
1968	503.5	40.62	20.5	21.04	9.0	11.5	15.6	0.7107	11.0	88.8
1969	515.5	40.48	20.9	20.76	9.0	11.9	16.3	0.6768	11.0	99.8
1970	527.4	40.34	21.3	20.48	8.9	12.4	17.0	0.6446	11.0	110.8
1971	539.4*	40.2*	21.7	20.2*	8.7	13.0	17.8	0.6139	10.9	121.7
1972	553.4	40.16	22.2	20.1	8.6	13.6	18.6	0.5847	10.9	132.6
1973	567.4	40.12	22.8	20.1	8.6	14.2	19.4	0.5568	10.8	143.4
1974	581.4	40.08	23.3	19.9	8.6	14.7	20.1	0.5303	10.7	154.1
1975	595.4	40.04	23.8	19.8	8.5	15.3	20.9	0.5051	10.6	164.7
1976	609.4*	40.0*	24.4	19.7*	8.5	15.9	21.7	0.4810	10.4	175.1
1977	625.8		25.0	19.58	8.4	16.6	22.7	0.4581	10.4	185.5
1978	642.2		25.7	19.46	8.4	17.3	23.7	0.4363	10.3	195.8
1979	658.7		26.3	19.34	8.3	18.0	24.6	0.4155	10.2	206.0
1980	675.1		27.0	19.22	8.3	18.7	25.6	0.3957	10.1	216.1
1981	691.5*	40.0*	27.7	19.1*	8.2	19.5	26.7	0.3769	10.1	226.2
1982	710.4		28.4	19.1	8.2	20.2	27.6	0.3589	9.9	236.1
1983	729.3		29.2		8.2	21.0	28.7	0.3418	9.8	245.9
1984	748.2		29.9		8.2	21.7	29.7	0.3256	9.7	255.6
1985	767.0		30.7		8.2	22.5	30.8	0.3101	9.6	265.2
1986	785.9*	40.0*	31.4	19.1*	8.2	23.2	31.7	0.2953	9.4	274.6
			615.2		227.7	387.5	529.8		274.6	

* Uninterpolated values.

1. Excess means the excess over the required number to **stabilize** the population at the anticipated 1961 value of 430 millions. These are real excesses because additions to the future labor supply are classified in the plans as burdens, not assets to the economy.

1.1. It is assumed that birth rates are maintained at their age specific values for 1951, resulting in crude birth rates per 1,000 varying from 41.9 in 1961 to 40.0 in 1976 and thereafter.

1.2. It is assumed that the expectation of life at birth increases from 43.4 years in 1961 to 52.3 years in 1981 and thereafter resulting in the drop of birth rates required for stability from 23.0 per 1,000 in 1961 to 19.1 per 1,000 in 1981 and thereafter.

2. In the 26 years from 1961 to 1986, the anticipated births are 615 millions, the required births for stability are 228 millions and the excess births are thus 387 millions, rising from 8.1 millions in 1961 to 23.2 millions in 1986.

3. The following are taken to be the private and/or public costs of raising a child to age 15, assuming that he or she lives, and, in accordance with the constitutional Directive, he or she goes to school from age 6 through age 14.

3.1 Food: age 0-9: Rs.84.5 per year.
age 10-14: Rs.170.0 per year.

3.2 Schooling direct costs: age 6-14: Rs.40 per year.

3.3 Clothing: age 0-5: Rs.2 per year.
age 6-14: Rs.25 per year.

3.4 Medical expenses: age 0-14: Rs.3 per year.

3.5 Total expenses per year: age 0-5: Rs. 89.5
age 6-9: Rs.152.5
age 10-14:Rs.238.0

3.6 The costs for any child at birth are the costs incurred in a given year times the probability that the child survived to that year times the discount factor, $(1.05)^{-n}$, where n is the number of years from ages (0 plus 0.5) to (x plus 0.5). The sum of these present values for ages 0.5 to 14.5 is taken to be the present value of raising a child from age zero to age 15. It amounts to Rs.1,368 per child.

4. The current cost of having excess children is the present value of raising a child to age 15 times the number of excess children born in a given year. The sum of such current costs, 1961 to 1986, is estimated to be Rs.530 billions, rising from Rs.11.1 billions in 1961 to Rs.31.7 billions in 1986. The present value, 1961, of the total costs of these 387 million excess children is Rs.275 billion, or 220 percent of the anticipated Indian National income in 1961 of Rs.125 billion. The present value in 1961 of costs of excess children starts with Rs11.1 billion for those born in 1961, rises to a maximum of Rs.11.2 billions for 1962 to 1964, and declines gradually to Rs.9.6 billions for the 1961 cost of the excess born in 1986. The 1961 cost of excess children born in 1961 is Rs.1,368 per excess birth. The 1961 cost of excess children born in 1986 is Rs.405 per excess birth.

5. The age specific birth rates assumed to have prevailed in 1951 and continued to 1986 imply an average generation of 27 years and 5,433 births during their lifetime per 1,000 women entering the

child bearing age of 15. Of 2.050 children born under the ultimate life table of 1981, 838 of them would be females who would attain age 15 and be potential producers of 4,533 children. The prevention of the birth of one child, on the average, therefore, implies the prevention of 2.22 children in the later generation. If the present value of the cost of a birth, and an average of 2.22 appear 27 years later per excess child born, then the present value in 1961 of raising one excess child to age 15, if he lives, plus the costs of raising an average set of his descendants in the indefinite future is Rs.3,374. The cost in 1961, therefore, of having 8.1 million excess children born in 1961 is Rs.27 billions, of which 40 percent is for births of that year, and 65 percent is the cost of those births plus their children.

6. The tragedy is that few people will consider those as real costs in 1961. If they are so considered, notice that if Rs.1,000 were spent to prevent each excess birth and the remainder were saved and invested, there would be available Rs.19.2 billion in 1961 alone for such investment or over 15 percent of the national income. Such excess children are a luxury that India cannot afford.

APPENDIX 8

Summary

A8.1 It is believed that the preceding appendices have given evidence of the following pertinent statements:

- (1) Factors operating at present indicate, unless they are deliberately interfered with, a rise in the total population from 362 millions in 1951 to 480 millions in 1966 to 786 millions in 1986. The acceleration in such population growth is exclusively attributable to a declining death rate.
- (2) With such a population growth, the percentage of the population in the working ages may be expected to decline from 59 in 1951 to 56 in 1966 to 54 in 1986. The percentage of persons in the dependent ages to those in the working ages of 15 to 64 is therefore expected to increase from 69 in 1951 to 79 in 1966 to 86 in 1986. This is a heavy and increasing burden of dependency, which contrasts markedly with values under 50 for many developed countries. It also contrasts greatly with the 53% value that would eventually be arrived at if the life table assumed for 1981 were to persist together with a population stabilized at a particular size.
- (3) Most of this dependency is derived from children under age 15, who are expected to increase from 136 million in 1951 to 198 million in 1966 to 334 million in 1986. Thus from 1951 to 1966 it is expected that 53% of the total increase will be from such children, and in 1966 to 1986, it is expected that they will comprise 44% of the total increase.

(4) The main aim of Indian planning is to double the real per capita income from 1961 to 1981. If India is successful in attaining a goal of Rs. 125 billion national income in 1961 for the expected 430 million people, this means a per capita income of about Rs. 290. At constant prices, with a population of 691 millions in 1921, this implies a national income of Rs. 402 billion by 1981 or a total increase of 222% and an average increase in national income at constant prices of 6.0% per year. The enormity of this problem may be judged from the fact that the gross national product of the United States increased only 121% in the 27 years from 1929 to 1946 in constant dollars, during which time the per capita share of the gross national product increased only 60%. (Stat. Abst. of the U.S., 1957, Tables 360 and 362.)

(5) One should not believe that it is necessarily easier to generate an accelerating national income if one starts at a low per capita rather than a high per capita level. That depends on the balance of land, labor, capital, and managerial skill. Of these four components, approximately 30 countries have less arable land per person than India, among which are some countries with very high per capita income. Although the land factor is adverse, the real problem is the excess of labor relative to capital and managerial skill. The result is low output per worker. Even though wages are among the world's lowest, productivity is so low that India is having trouble competing in the world's markets because of high prices even

in its specialty lines of textiles and jute manufactures.

In 1956, the value added per total employee was only Rs. 2,130 (₹447) for cotton textiles and Rs. 1,420 (₹298) for jute textiles (Pitamber Pant: Occupational Pattern in Manufacturing Industries, GOI, India, 1959, Table T5.15). The great bottlenecks in India are managerial skill, which may be improved relatively no matter what happens to the population, and lack of capital per worker, the improvement of which depends on what happens to the population.

(6) The Plans consider the successive increases in the labor force as burdens to be met, not assets to the economy. If children under age 15, greater than those required to maintain a stable population of 430 millions, are considered excess, it is estimated that there will be 387 million excess births between 1961 and 1986, rising from 8.1 millions excess in 1961 to 23.2 millions excess in 1986. It is further estimated that, at birth, the average present value at 5% of raising a child to age 15 is Rs. 1,368 (₹287) for food, schooling, clothing, and medical expenses. For the 8.1 million excess born in 1961 alone, the present value of these costs is Rs. 11.1 billions or about 9% of the anticipated national income. If Rs. 500 on the average were spent to prevent these 8.1 million excess children, there would be a direct saving to the economy of Rs. 7.0 billion. Furthermore, the Rs. 500 of expense, if it contained primarily a payment to individuals, might be largely recoverable for development expense.

(7) Not only do these excess children divert economic effort to their maintenance until they reach age 15, but also they themselves will require capital to maintain themselves at average living standards when they attain labor force age.

(8) It is evident that to attain the goal of doubling the real per capita income from 1961 to 1981, the denominator of the ratio, namely population, is actually a more critical value for India than is the numerator, i.e., national income. The national income is produced mostly by persons of labor force age. The higher their proportion to the total, other things being equal, the greater the per capita income. But the output of these workers is dependent on the previous savings and investment pattern. With the present and anticipated higher dependency ratio, not only is it harder to get the absolute amount of savings required for additional capital per worker; but also a large portion of those savings must be diverted to otherwise unnecessary irrigation and fertilizer development for more food, to school and hospital development, and to housing for the additional excess population. The net result is that a lower total national income may be expected with high fertility than with low fertility and one may expect a deceleration in the increase of per capita income rather than an acceleration. (For an analysis using an econometric model, see Coale and Hoover, Chapter XVII.)

(9) It may be appropriate to end this summary with a brief note on the meaning of an optimum population, even though

no attempt to establish the optimum for India has been made here. The only idea expressed in these appendices pertinent to "optimum" has been to show that India had surpassed it by 1951.

It is evident that optimum may be considered from many points of view. The optimum population for producing a specified number of geniuses may differ from the optimum population to provide ascetic privacy and contemplation. Nevertheless, there appear to be certain common elements dominating such various parts of the world today as the United States, India, the Soviet Union, Communist China, most of Africa and Latin America. Whether one likes it or not, the dominant aim seems to be to increase simultaneously real per capita income and leisure time. Leisure time is taken in the broad sense of time left over after producing basic necessities. For many parts of the world, it means diverting children from the labor force to the school. For others, it means less hours of work per year. Now the idea of an optimum population must therefore contain at least two elements: (1) For the foreseeable future there must be a population not exceeding that which permits an increase in both real per capita income and leisure time. (2) The population, to be within optimum limits, must not be so large that a target of real per capita income and leisure time desired by the group and already attained by another group cannot be expected to be met, although it could have

been met with a smaller population. In essence, this means that it is not enough merely to progress; the society must be able to progress sufficiently to meet targets that it is convinced are reasonable. It is believed that India can progress even if there is no population control; but we believe that the population is already so large that it is unlikely that the targets of real per capita income and leisure time already attained by many countries can be attained by India at any reasonable future date unless there is drastic population control. It is further believed that, in accordance with the idea of "rising expectations," India's goals, among others, should be an educated population with a life expectancy of 65 to 70 years at birth, average daily consumption of 3,000 calories of wholesome food and a varied diet with sufficient additional amenities such that India is not thought of nor do Indians consider themselves to be among the world's underprivileged people. Now it may truthfully be said: "If you want to see misery, go to India." This must be changed; but how it can be changed much without strict population control, is not apparent.

APPENDIX 9

The Government of India and Family Planning

A9.1 A brief partial history of the activities of the Government of India in family planning follows, taken from "Family Planning in India, A Review of the Progress in Family Planning Programme April 1956 - November 1958", by the Ministry of Health, Government of India, New Delhi. Page references are to this document:

1.1 The Government of India appointed the Planning Commission in March, 1950. p.3.

1.2 On April 11, 1951, the Panel of Health Programmes of the Planning Commission appointed a committee to report on population growth and family planning. p.3.

1.3 A Family Planning Cell was established in the Directorate General of Health Services in April, 1952. p. 6.

1.4 On December 7, 1952, the Planning Commission recommended a program for family limitation and population control and Rs. 6.5 millions were provided for it.

1.5 On May 6, 1953, the Family Planning Research and Programmes Committee was appointed to "make recommendations to the Government of India regarding research schemes and experimental and other programmes relating to family planning to be adopted and the nature and amount of assistance, if any, to be given to existing voluntary organizations in the field of family planning after a review of their present activities." p.4.

1.6 A Grants Committee was appointed on May 28, 1954. The pattern of financial assistance approved by the Government of India was adopted, calling for 100% payment by the Center for non-recurring expenses and a sliding scale beginning at 100% and declining gradually to 33-1/3% of recurring expenditure after 2½ years. p.6.

1.7 An Officer on Special Duty was appointed on June 25, 1955 to start a training center. p.6.

1.8 During the First Five Year Plan, the Central Government spent Rs. 1,582 thousand on the programme. Grants-in-aid were given to fifteen State Governments, eight Local Bodies and thirty-five Voluntary Organizations. The number of clinics opened was 147 (21 rural and 126 urban) of which 86 were by State Governments. p.6.

1.9 The Central Family Planning Board was formed September 1, 1956 with the Minister of Health as Chairman. A Standing Committee of this Board was formed on January 2, 1957 with the Secretary, Ministry of Health as Chairman. pp.9,10.

1.10 By the end of 1958, Family Planning Boards had been formed in the States of Andhra Pradesh, Assam, Bihar, Bombay, Kerala, Madhya Pradesh, Madras, Mysore, Orissa, Punjab, Rajasthan, Uttar Pradesh, and West Bengal; i.e., all States but Jammu and Kashmir. Family Planning Officers had been appointed in Andhra Pradesh, Bihar, Bombay, Kerala, Madras, Mysore, Punjab, Rajasthan, Uttar Pradesh, and West Bengal; i.e., all States but Assam, Jammue. and Kashmir, Madhya Pradesh, and Orissa.

A Director of Family Planning had been appointed in the Central Directorate General of Health Services, reporting to the Director General. p.10.

1.11 The provision in the Second Plan was Rs. 40 million at the Centre and Rs. 9.7 million in the States. The tentative allocations were in rupees thousands: Service: 37,325; Training: 1,575; Education: 5,000; and Research: 5,000.

The goal was to have 2,000 rural clinics and 500 urban clinics in operation by 1961. pp.10,11. Actually, by the beginning of 1959, 822 clinics had been opened of which 47 were Local Body, 103 were Voluntary Organization, and 672 were State clinics.

p.16. Training Centres had been established and 2,121 persons had been trained during this part of the Second Plan in addition to 67 during the First Plan. Of these 2,121, 943 were doctors, 287 were health visitors, 251 were social workers, and 640 were "others." p.18. Posters, pamphlets, and folders had been distributed widely, radio programs had been broadcast and considerable research had been carried out on contraceptives, including oral contraceptives. pp.20,21. Active participation had been obtained from the Ministries of Information and Broadcasting, Labour and Employment, Home Affairs, Defence, Commerce and Industry, and Education and from such groups as the All India Women's Conference, the Indian Medical Association, the Indian Red Cross Society, the Press, the Medical Council of India, the Indian Nursing Council, the Indian Council for Child Welfare, and the Family Planning Association of India. pp.22-25.

A9.2 There is no doubt of the general, although not universal support of this program of family planning. The following excerpt is taken from the Proceedings of the second Family Plan Board Meeting, May 25, 1957:

"Inaugurating the meeting the Prime Minister (Mr. Nehru) (said) 'Whether it is from the political, economic, or social point of view, all these problems drive us to the conclusion that we must take up this question of family planning and press it forward with vigour and intelligence. To make family planning a success, the message should reach the average peasant or worker in India.'"

From the Proceedings of the Meeting of the Central Family Planning Board held February 15 and 17, 1959, it is noted that Mr. Karmarkar, Chairman of the Board and Minister of Health "informed the members that the General Body Meeting of the Congress Party with the Prime Minister presiding, on the 20th December 1958 had recommended to the Government 'to intensify their efforts towards the propagation of family planning and to provide facilities including surgical facilities (for voluntary sterilizations) free of charge.' He (Mr. Karmarkar) added that the Government would be guided by these recommendations."

A9.3 Table A9.3 contains information assembled primarily from Appendices D & F of "Family Planning in India" cited in A9.1. All states and centrally administered territories are included in the table. It indicates the widespread acceptance and participation in the scheme. It is interesting to note that although the Plan

for 1961 was only about one-third fulfilled by 1961, nevertheless the number of urban clinics established by 1958 already exceeded the goal for 1961 in Assam, Bihar, Madhya Pradesh, Orissa, Delhi, Himachal Pradesh, and Manipur. Andamans was the only unit without a clinic by 1958.

It should be noted too that the population data are taken from this particular source, and they are not necessarily consistent with the estimates given in Appendix 2.

If one concentrates attention on the fourteen states, it should be noted that six of them have at least one clinic in every district in the state. Assam, Jammu and Kashmir, Uttar Pradesh, and West Bengal appeared to have the least widespread distribution throughout their states.

Table A9.3. Selected Data on Family Planning in India by States, November 30, 1958

S T A T E	Millions of Estimated Population			No. of Family Planning Clinics						No. of Dist- icts, 1958	
				Planned by 1961			Opened by 1958				
	To- tal	Ru- ral	Ur- ban	To- tal	Ru- ral	Ur- ban	To- tal	Ru- ral	Ur- ban	To- tal	With Cli- nics
Andhra Pradesh	35.4	29.3	6.1	220	176	44	102	87	15	20	20
Assam	10.3	9.8	0.5	61	58	3	45	36	9	17	8
Bihar	41.7	38.7	3.0	273	252	21	48	22	26	17	17
Bombay	54.8	39.8	15.0	341	232	109	87	49	38	43	43
Jammu & Kashmir	4.7*	3.9*	0.8*	30	24	6	2	0	2	14	2
Kerala	15.8	13.8	2.0	92	78	14	48	35	13	7	7
Madhya Pradesh	27.7	24.2	3.5	179	154	25	98	67	31	43	39
Madras	33.1	25.1	8.0	211	152	59	94	67	27	13	12
Mysore	22.1	17.4	4.7	130	96	34	30	12	18	19	17
Orissa	15.4	14.7	0.7	98	94	4	53	25	28	13	13
Punjab	17.3	13.9	3.4	112	88	24	25	14	11	18	13
Rajasthan	17.7	14.5	3.2	109	86	23	38	25	13	26	26
Uttar Pradesh	68.6	59.1	9.5	435	366	69	60	36	24	51	30
West Bengal	28.8	22.0	6.8	173	124	49	51	19	32	17	12
Delhi	2.3	0.7	1.6	13	2	11	30	0	30	1	1
Himachal Pradesh	1.2	1.1	0.1	7	6	1	7	0	7	5	5
Manipur	0.6	0.6	0.0	5	4	1	2	0	2	1	1
Tripura	0.8	0.7	0.1	5	4	1	1	0	1	1	1
Pondicherry	0.4*	0.3*	0.1*	3	2	1	1	0	1	1	1
Andamans	0.4*	0.3*	0.1*	3	2	1	0	0	0	1	0
Total	399.1	329.9	69.2	2,500	2,000	500	822	494	328	328	268

* Estimated from planned units relative to population.

Appendix 10. Present Effectiveness of Family Planning Programs
in India.

A10.1 Effectiveness must be measured against goals. If the goal is to have a population stabilized at about 430 millions, it has already been shown that about 8.1 million births among those expected in 1961 will be excess. In the Census of India, 1951, Part 1-A-Report, the Registrar-General, Mr. R. A. Gopalaswami defined "improvident maternity" for India as a "child-birth occurring to a mother who has already given birth to three or more children, of whom at least one is alive." (p.217). He goes on to say "Out of every 40 births which occur among every 1,000 people in the course of one year, 17 births are of this (improvident) nature." With 430 million people in India in 1961, the Registrar-General's estimate would imply 17.2 million births of which 7.3 million would be classified as improvident. At the 6th meeting of the Central Family Planning Board, held February 15 and 17, 1959, the proceedings report Mr. Gopalaswami (no longer Registrar-General) as follows:

"Strongly advocating voluntary sterilization, he added that the future plan must promise definite results which should be feasible within a certain time.....He estimated that in a community of 1,000 persons there would be 180 married couples in the child bearing stage of their married life, among them 70 couples in the age group of 25 to 34 and if every married couple decided to have either a vasectomy or salpingectomy at some stage in the 10 year period, the annual number requiring sterilization would be seven. He stated that he was not against mechanical and chemical contraceptive appliances which could be used by 10 to

15% of the population; but he was convinced that 85% would require sterilization." For 430 million people, this implies 30.1 million couples age 25 to 34, one-seventh of whom are 4.3 million couples and 85% of these would be 3.7 million vasectomies or salpingectomies every year. This seems inconsistent with his previous figure implying 7.3 million inadvertent birth; but it must be remembered that there would be a tremendous back-log in 1961. His 3.7 million annual sterilization would be appropriate if the program had started 10 years before with nearly the same magnitude. At any event, these values show that effectiveness requires reductions numbering in the millions. To get evidence at about the 0.99 probability level of a drop in the true birth rate from 40 per 1,000 to 39 per 1,000 in the absence of nearly complete registration requires a sample taken at random with good reporting of over 220,000. Under the conditions of data collecting in India, therefore, it is very difficult to get good evidence of what is happening to the birth rate except from samples taken under about the same conditions that reveal fairly marked changes. Such samples are not available.

A10.2 In 1951, the Indian birth rate quoted in the Demographic Year Book was 24.9 per 1,000. According to S. P. Jain, Census Actuary in Annexure II, Part I, page 144 of Part 1-B of Volume I of the Census of India, 1951, the registered birth rate 1941-1950 was 28 per 1,000; but his estimated birth rate, 1941-1950, is 39.9 per 1,000. Coale and Hoover's estimated value for 1951 was 43.2 per 1,000, and according to their high projection, which

assumes no change in age-specific birth rates, the intermediate value between 1956 and 1961 would be 42.4 per 1,000. The first comparison to be made is between Jain's estimated birth rate for some states in 1951 and the birth rates obtained from the first sub-round of the 14th round of the National Sample Survey by states. This involves two complications: (1) In 1956 many state boundaries were changed radically, and (2) there is evidence from the data of the National Sample Survey of understatement of births in the preceding year. In Table A10.2, one may find how the 1951 and 1958 states have been equated as well as possible. Two values are also given for the National Sample Survey birthrates which should be centered as of about February 1, 1958. These two values are the reported values based on the reported data and the adjusted values. Since the data were reported as "birth rate last year" and "birth rate year before last", the adjustment was based on the assumption that there was 100% reporting of births during the three months prior to the survey and that there was a linear decline prior to those three months such that the line passed through the properly centered reported values for last year and the year before last. The adjustment therefore involves adding to the last year value one-quarter of the difference between the last year value and that of the year before last. The assumption is, of course, that during the two year period, the birth rate did not rise, as the data indicated, but it remained constant. The probability sample is based on a complete census of 416 villages unless the village had over 1,000 population, in which case, it

was segmented and a portion less than 1,000 was taken at random. It must be remembered that Jain's data refer to urban and rural population, the NSS to rural only. Later it will be shown that there is no evidence that urban birth rates fall below rural.

Certainly the results shown in Table A10.2 give no evidence of a declining birth rate for India in general. One may question why the contiguous states of Bihar and Uttar Pradesh appear from the data to have changed fairly markedly in opposite directions. We do not know whether or not the shift really existed.

Without question these are the best data we have for any detailed comparisons. It is doubtful, under the uncertainties of both Coale and Hoover's estimates and the adjustment factor that assumes only a 5.6% recall lapse for India as a whole that one should say that there is a real difference between Coale and Hoover's estimate of about 42.4 per 1,000 and the adjusted values of 41.1 per 1,000. In any event this value is higher than Jain's estimate of 39.9 for 1951. The Indian Statistical Institute has not as yet released any studies on recall lapse for the 14th round; but it is hoped that they will.

Table 110.2. The Census Actuary's Estimated Birth Rates for 1951 and The National Sample Survey's Reported and Adjusted Birth Rates as of February 1, 1958 for India by States.

(Rates per 1,000)

1951 States	1958 States	Estimated Birth Rate, 1951	Estimated Birth Rate 1958		As of 1958 Estimate to 1951 Estimate	
			Re-ported	Ad-justed	Re-ported	Ad-justed
Jammu	India, including Jammu and Kashmir		38.8	41.1		
Combined States listed below	States groups starred below	36.5	37.2	39.6	102	108
	Jammu and Kashmir		29.1	30.4		
Punjab (wt. 7) and Delhi (wt. 1)	*Punjab, Delhi, and Himachal Pradesh	41.3	40.3	42.2	98	102
	Rajasthan		43.6	45.3		
Uttar Pradesh	*Uttar Pradesh	35.9	46.1	49.1	128	137
Madhya Pradesh	*Madhya Pradesh	39.9	42.4	43.9	106	110
Bihar	*Bihar	49.9	33.2	35.2	67	71
	Orissa		40.8	45.2		
West Bengal	*West Bengal	27.0	30.6	32.1	113	119
Assam	*Assam, Manipur, and Tripura	37.2	36.6	39.1	98	105
	Andhra Pradesh		32.2	33.2		
Madras	*Madras	29.1	30.9	33.4	106	115
Travancore - Cochin	*Kerala	36.6	37.2	39.2	102	107
	Bombay		38.9	40.7		
	Mysore		40.9	43.8		

*Weighted in accordance with 1951 States population. These states comprise 67% of the 1951 population, excluding Jammu and Kashmir and part of Assam.

A10.3 In addition to the data cited above based on preliminary results from the 1st subround, data are now (August 1959) available on birth rates from the first four subrounds by region, but not by state. Table A10.3 gives the results. The total of 1,744 villages probably amount to a total sample of not far from 900,000 persons. In each subround, the villages are equally divided among the two subsamples. If the estimate of 5.6% omissions because of recall lapse is correct, the all India result would be a birth rate of 41.0 per 1,000, almost identical with that obtained in A10.2 (But this coincidence does not make them correct!). If the omissions are 10%, as they appear to have been in other good, checked surveys in India, the birth rate would be 43 per 1,000. In either event, there is no evidence of a significant drop since 1951. It may be observed that most subround 3 values are lower than those of other subrounds. In subrounds 1 and 2, questions were asked about births for each woman in the household who was a "usual resident". In subrounds 3 and 4, the questions were asked about all usual residents collectively. We do not yet know whether this change really increased the omission rate in subround 3. Nor do we know why all but 2 of the 10 sample values in the fourth subround exceeded both of the corresponding sample values for the same region in the 3rd subround.

A10.4 One other bit of cumulative evidence is available from the National Sample Survey. Consistent values of over 40 percent of the population are appearing at ages under 15. Yet it is in these ages that one would expect the greatest omissions.

Table 10.3. Annual Rural Birth Rates per 1,000 Persons from Two Independent Samples, National Sample Survey 14th Round, First Four Sub-Rounds Taken in India, July 1958 to March 1959.

Z O N E	No. of Sample Villages per Subround	Sample	Subround				
			1	2	3	4	1 - 4 Com- bined
<u>North:</u> Rajasthan, Punjab, Himachal Pradesh, Delhi, Jammu and Kashmir	90	1	42.5	43.9	40.2	50.3	44.6
		2	39.9	37.6	37.5	43.6	39.8
		Total	41.2	41.3	38.9	46.9	42.3
<u>Central:</u> Uttar Pradesh and Madhya Pradesh	94	1	45.1	45.7	42.6	45.6	44.6
		2	44.8	51.5	39.1	45.9	45.8
		Total	44.9	49.2	41.2	45.7	45.2
<u>East:</u> Bihar, Orissa, West Bengal, Assam, Manipur, and Tripura	102	1	32.2	33.8	33.6	37.0	34.3
		2	33.0	34.5	30.0	35.2	33.4
		Total	33.6	34.2	32.0	36.1	33.9
<u>South:</u> Andhra Pradesh, Madras, and Kerala	78	1	32.7	34.3	33.7	37.1	34.3
		2	35.4	36.3	32.1	33.5	34.2
		Total	34.1	35.2	32.9	35.0	34.2
<u>West:</u> Bombay and Mysore	72	1	38.2	39.5	37.8	40.6	39.0
		2	40.6	38.1	39.9	36.9	38.8
		Total	39.4	38.7	38.7	38.7	38.8
<u>All India:</u> rural	436	1	38.4	38.8	37.5	41.6	39.1
		2	38.6	40.4	35.0	38.6	38.3
		Total	38.5	39.7	36.4	40.2	38.7

Even with Coale and Hoover's increase in the proportion of people in this age group over the Census Actuary's upward adjustment, they estimated only 38.8% under age 15 in 1951. The combined figure is currently 40.7%. It is true that this could mean a lower birthrate and a very much lower death rate in the young ages; but such an apparent increase would at least make it tenable that the birthrate had not dropped.

A10.5 There are very sparse good data on the difference between urban and rural birth rates. What is really needed to compare the two are age-specific birth rates; but no such good data are available. One is restricted to such piecemeal information as the following: (1) A current study of Old Delhi City by the Demographic Institute of Delhi University is revealing^a crude birth rate of 64 per 1,000. This may be lower than it was; but there is no evidence from this compared with the rural estimates of the NSS, that urban rates are lower than rural. (2) In the National Sample Survey Report No. 7 on Couple Fertility, Table 3.3 gives the following percentage distribution for 14,110 rural couples and 6,175 urban couples for the 4th Round in 1952.

<u>Total Children Born</u>	<u>Percentage of Couples</u>	
	<u>Rural</u>	<u>Urban</u>
0	27.2	22.7
1 - 4	45.1	49.9
5 - 8	23.7	21.9
9 - 12	3.9	5.2
13 and above	0.1	0.3
Total	100.0	100.0

There is no evidence here of a real difference between rural

and urban fertility. Furthermore, among the Hindus, no real differences appear between similar rural and urban caste groups. (See their Table 6.8).

A10.6 It is reasonable to suppose that there is more awareness of family planning methods in urban than in rural areas. The data we have refer almost exclusively to urban areas, and they can therefore be taken as maximum. The difficulty is in interpreting the meaning of the data. A supplementary note was presented by the Institute of Public Opinion Ltd., at a meeting of the Demographic Advisory Committee in New Delhi on August 10, 1959. The Institute was proposing a survey, based on the assumption that "40% of the couples in the urban areas have ever used this (any family planning) method." But they go on to say that "Preliminary results of the 1st subround of the 14th Round of the N.S.S. regarding family planning questions which was put to the youngest male married members of the sample households who have attained at least 20 years of age indicate that 11.6% households in the urban areas are aware of family planning method and 3.8% have ever used it. According to the Ministry of Health (Family Planning Unit), 50% of the couples in urban areas are aware of family planning and 40% use it. In one of the recent surveys conducted among the middle class families in Calcutta city by the Indian Institute of Public Opinion it was found that 83% of married women have knowledge of family planning and 50% have ever used any method of family planning." This illustrates

the most up-to-date knowledge and indicates the lack of good information on awareness. Obviously such knowledge about the state of awareness is of secondary interest to what is happening to the birth rate or to the size of family. Increased awareness, however, should make a concerted program easier unless there were awareness accompanied by abhorrence. A flat conclusion appears in a "Socio-Economic Survey of Hyderabad-Secundrabad City Area" issued by the Indian Institute of Economics, Hyderabad, in 1957. "It is too premature to think of Family Planning for the low income range." (p.xx) The current range of thought seems to run from great optimism to great pessimism on the awareness and acceptability of the program even among those who favor it.

A10.7 It is significant that no evaluation of results of the Family Planning program appears in "Family Planning in India, April 1956 November 1958" issued by the Ministry of Health. There is detailed discussion of money, training, how many clinics are needed, and how many have been set up. One exception appears in Appendix E where reference is made to nine centers that have been opened in the Delhi area. By October 1958, the nine clinics contacted 85,785 married persons, of whom 8,117 had been given advice, of whom 5,519 had "followed advice". There had been 17 persons for whom sterilization had been advised; but there is no statement concerning the number sterilized. It is known that although Punjab is supposed to provide free foam tablets, they are difficult to get by some poor people who want them. Indeed, the policy for all India of the Central Family Planning Board according to an

Agenda item statement for a meeting on November 15, 1958 is that "all contraceptives are given free to those with income less than Rs.100/p.m., at half price to those with income between Rs.100/ and Rs.200/p.m. and at cost price to those with incomes above Rs.200/p.m. In addition foam tablets and sheaths are given free to all in rural clinics irrespective of income." Table A10.7 gives the sales of contraceptives in India for some periods, 1956 to 1959, as reported by the Family Planning Unit of the Health Ministry. These sales figures were obtained from manufacturing companies and presumably include sales to governments for free distribution. It is not known what proportion of the total sales this table represents; but it would be surprising to have it released if it were not considered to be a high percentage. At any rate, for the estimated 89 million women, age 15-44 in 1959, most of whom were married (but some already widowed), these sales figures do not imply widespread use by married couples. There is no evidence that is any good on the use of other methods of pregnancy prevention.

Disregarding the three operating centers that did not report, districts containing about two-thirds of the population have functioning clinics. (But notice that Jaipur, containing the capital and the leading medical college and hospital does not appear. It probably has one or more of the non-reporting clinics). In the 16 districts where clinics are reported functioning, there is an average of one clinic for 437,000 people as of 1951, ranging from 1 for 226,000 in Sikar to 1 for 907,000 in Bharatpur. The average square miles per clinic is 3,236 in these 16 districts, ranging from 1,011 in Sikar to 9,713 in Bikaner. If a district of 3,236 miles were square, it would be nearly 57 miles on a side. If the clinic were in the middle, and if there were straight roads, the maximum distance to a clinic in that district would be 40 miles. If the population were uniformly distributed, the average distance would be 20 miles, a major journey under Indian conditions. Actually, none of these conditions prevail; and the probable situation is that the clinic is in a fairly large town serving primarily those within two to five miles of the clinic.

The "cases attended" averaged 1 per 3,400 population in these districts, ranging from 1 per 415 (1951 population) in Sikar to 1 per 105,000 population in Ganganagar. Assuming roughly a family of five on the average, between 1 in 500 and 1 in 600 families would have "cases attended" if there were no duplicate cases within a family. If sterilizations are included in "method advised", there seems to have been no method advised to at least

1,859 or about 40% of the 4,528 cases. On the other hand there must have been repeated advice to the same case on foam tablets in Bharatpur and condoms in Pali and Kotah. The sterilizations averaged 1 per 17 cases attended, ranging 1 per 2 cases attended in Alwar to zero per 591 cases attended in Sawai Madhapur. They averaged 1 per 40,000 population in the 16 districts, contrasted with Gopalaswami's required estimate of about 240 per 40,000. The maximum was in Jodhpur, where the ratio was about 1 in 6,600 population, which would be about 2.5% of Gopalaswami's required estimate of 85% of 7 per 1,000 population.

A10.9 Table A10.9 is the reported number of sterilizations conducted during 1957, 1958 and part of 1959 by states. The first point to make is that the intent in back of these operations is not known. A woman who wants several more children may have a complete hystorectomy. It is not known whether that is included here. Secondly, there is no evidence on age or number of living children. In spite of these deficiencies, several interesting points may be observed:

1. The increase in the total from 1957 to 1958 was 39% ranging from a decrease of 80% for Delhi to an increase of 345% for Orissa (neglecting Manipur because of small figures). The increase in female sterilizations was 50% and that of males 20%. This is somewhat surprising because of the emphasis in the literature on vasectomies in preference to salpingectmies.

2. There are nine states with data for part of 1959. If these are converted to annual equivalents, they show an increase

of 29% over 1958, whereas the same nine states showed an increase of 105% in 1958 over 1957. What the seasonal factor is, if any, is unknown. Increases, on this annual conversion basis, would be shown for Kerala (South), Mysore (West), Punjab (North), Uttar Pradesh (Central), Himachal Pradesh (North), and Manipur (East). Thus every zone is included. But decreases are shown for Andhra Pradesh (South), Bombay (West), and West Bengal (East). The north and Central zones are not represented. It is difficult to say what the current status is.

3. Male-female comparisons are available for 43 state-years. In only 10 of these 43 cases do male sterilizations (Vasectomies are simpler and safer than salpingectomies from a medical point of view) exceed female: Andhra Pradesh (South), twice; Kerala (South), once; Madras (South), once; Mysore (West), once; Punjab (North), three times; and Rajasthan (North), twice. Kerala shifted from 15% male in 1957 to 69% male in 1959. Madras, the home of Gopalaswami, the great advocate in India of vasectomies, shifted from nearly 60% male in 1957 to 35% male in 1958, and its decline in total was exclusively attributable to the decline in male sterilizations.

4. As a check on Gopalaswami's quota of 85% of 7 per 1,000 as an annual need (See A10.1 above), disregarding backlog, one starts with an estimate of about 407 million people in India in 1958. 85% of 7 per 1,000 would be 2.4 million operations. Actually there were reported 20,650 or less than 0.9% of Gopalaswami's quota, which means the backlog is increasing rapidly not

decreasing, or it would probably be more correct to say that the effect is miniscule, particularly since many of these operations may have been to parents of already large families.

5. It is interesting to observe whether there is a crude correlation between operation rates and either birth rates or growth rates by regions. The following table summarizes the material from four rounds of the current National Sample Survey and the 1958 data in Table A10.9 by zones. Population estimates are for March 1959.

<u>Zone</u>	<u>Estimated Operations per Million Persons, 1958.</u>		<u>Rural Birth Rate, 1958-59.</u>		<u>Rural Growth Rate 1958-59.</u>	
	<u>Number</u>	<u>Rank</u>	<u>Rate per 1,000</u>	<u>Rank</u>	<u>Rate per 1,000</u>	<u>Rank</u>
North	38	3	42.3	2	2.6	1
Central	30	4	45.2	1	1.6	5
East	19	5	33.9	5	1.8	4
South	78	2	34.2	4	2.0	3
West	87	1	38.9	3	2.1	2
All-India	50	-	38.7	-	1.9	-

It is true that the top three in growth rate are also the top three in operation rate; but it is doubtful that this represents evidence of correlative factors at work.

A10.10 The conclusion from the above evidence is that some institutional factors are potentially favorable on paper; but as of now, there is no evidence that any impact has been made that would lead to a reduced birth rate in the near future.

